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ABSTRACT

Presented is a student learning guide for high school students working independently on a self-paced research project in an environmental field. Students are introduced to environmental awareness and the environmental crisis, and are presented with a variety of techniques helpful in conducting a research project. Included are: choosing a problem, writing a proposal, conducting an interview, planning research, carrying out the research project, and project evaluation. (BT)

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STUDENT GUIDE

FOR

ENVIRONMENTAL EDUCATION PROGRAM

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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ATLANTA PUBLIC SCHOOLS
ATLANTA, GEORGIA
1972

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THE ENVIRONMENTAL EDUCATION PROJECT

ATLANTA PUBLIC SCHOOLS

September 1973

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All of the above contributed in various important ways to the development of the material contained within this book and to the assembling of it in the form presented.

FOREWORD

There are no textbooks for a student starting on a research project in the environmental field. No one book could possibly provide all the answers or give all the help for each individual trying to solve his chosen problem. All that this book or any book can hope to do is give you some guides so that you may help yourself.

Basically, what you need is an introduction to many things... to environmental awareness and the scope of the so called "environmental crisis"; to a variety of techniques that you may not have now, but which could be very helpful, such as photography or water testing; to the special skills of choosing a problem, writing a proposal, interviewing someone, or planning your research. We have tried to include in this guide some of the things that former participants in the program have found they needed.

Your orientation, which you can do at your own pace and in any order, should prepare you to go ahead on your own with the problem you have selected. Your advisor and the staff will be available for help with technical matters such as photographic and testing procedures, and you will have, either in your school library, in the environmental office, or in the hands of your advisor various bibliographies and lists of resources. We want to help when you need us, so never hesitate to ask; but, we know that one of the reasons you are in the program is that you like to work on your own.

Good luck, and have fun!

C. K. B.

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PUBLIC HEALTH DEPT.

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DANGER
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URANIUM
CHLORIDES
MERCURY
GULP

WHAT'S IT ALL ABOUT?

This overview section introduces you to some of the general aspects of the Environmental Education Program. In it you will find

... a definition of independent study

... an outline of what will be expected of you

... some selected articles which focus on the environmental crisis

WHAT DOES THE ENVIRONMENTAL STUDIES PROGRAM OFFER YOU?

You broaden your classroom to reach outside the school building into the whole city of Atlanta — and perhaps beyond.

You break away from the set hourly routine of the classroom day.

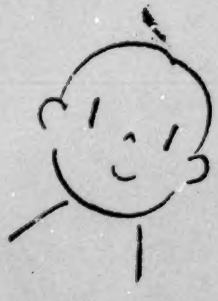
You have an opportunity to design a study problem that meets your particular interests and needs.

You work with knowledgeable persons in the community as resource people.

You develop independent study skills which realistically prepare you to meet the world outside high school — the job market and, particularly, the college program.

You have an opportunity to share your knowledge with groups other than schoolmates.

You participate in an environmental program that has been nationally recognized and acclaimed.



INDEPENDENT STUDY

(Learning on your own)

Schooling may be thought of as the process by which the student is helped to become sufficiently independent of school and teacher so that he can and will carry on his own learning enterprises successfully after schooling is ended. Usually, in school an individual's learning is largely directed by others, sometimes without a natural progression from teacher directed to self-direction as the learner becomes more mature and presumable more capable in self-direction. Ideally, education should develop the student to behave utimately as an independent learner. According to one source, the following are characteristics of an independent learner:

1. The independent learner undertakes on his own initiative learning tasks that are important to him.

2. He uses sources of information efficiently.

3. He tests out reflectively possible answers, solutions, ideas, to see whether they are adequate.

4. He seeks to apply generalizations from former to new situations.

5. He is not easily discouraged by the difficulty of the learning task nor by force which would have him accept inadequate answers, solutions, and ideas.

6. He enjoys learning and seeks opportunities to learn. *

*William M. Alexander and Vynce A. Hines, Independent Study in Secondary Schools. New York: Holt, Rinehart and Winston, Inc., 1967, p. 4.

WHAT WILL BE EXPECTED OF YOU IN THE ENVIRONMENTAL STUDIES PROGRAM?

That you gain a broad perspective on those environmental problems which, according to many respected authorities, are threatening the very survival of man.

That you investigate, by individual study, a particular environmental problem of your own choosing.

That you present your findings in some form (oral, written, or visual) to some audience (example — a school group, a civic group, an elementary class, or as a written report, in a newspaper or as a formal research paper; etc.).

You must

(1) Complete a period of introduction and orientation.

(2) Choose a problem for your "specialty."

(3) Draw up a proposal including a statement of the problem, how you plan to solve it; what you need to find out first; what resources (books, periodicals, films, tapes, interviews, etc.) you will use.

(4) Negotiate course contracts for school credit.

(5) Keep a journal (or log, or diary).

(6) Meet with your advisor at least once a week.

(7) Attend some, or all, of the announced seminars and field trips planned to broaden your environmental experience.

(8) Report your findings at the end of the study (in a pre-determined form).

(9) Prepare a one-page typed abstract of your project.

(10) Complete all requirements of the course contracts (some of these will be a part of the reporting in #8).

READINGS ON ENVIRONMENTAL TOPICS

Factual and philosophical material without end is being written and spoken on the general topic of what has been, is, and should be happening to our environment. One of the most famous of the essays in this field is that of the biologist, Garrett Hardin, entitled "The Tragedy of the Commons," a greatly condensed and simplified version of which is included here. The original was published in the magazine SCIENCE in the issue of December 13, 1968 (162: 1243-8).

The other brief readings are from a collection of quotes especially prepared for Earth Day, 1970. One is by the nationally known ecologist and professor at the University of Georgia, Dr. Eugene Odum.

You will be doing much more reading and hearing and viewing about environmental concerns. These articles are but an introductory sampling.

GARRETT HARDIN

TRAGEDY OF THE COMMONS

University of Illinois, Circle Campus, Chicago, Ill.
April 22

We have to watch out for people who have vested interests or who are merely caught in the rut of ancient ways of thinking, disguising the truth by a misuse of language. Much of this disguise we see is merely the result of ancient ways of thinking that haven't been reexamined. And it's this latter aspect of the problem that I particularly want to talk to you about today. In doing this I want to make use of a "scenario" that was written more than a hundred years ago by an Englishman named William Lloyd. This scenario I will call the "tragedy of the commons."

Imagine, Lloyd says, a common field open to all herdsmen who have cattle. Each herdsman keeps his own bunch of cattle, has them branded, and at the end of the season he gathers in his cattle to sell and take the profits. The pastureland is a commons open to all. Now as you probably know, each particular pastureland has a maximum "carrying capacity," and if you exceed that maximum capacity, you get not more proceeds, but less. So let us imagine that this commons is already being run at its maximum carrying capacity.

At this point one of the herdsmen thinks he might add one more animal to his herd, and he debates, should he or should he not? Acting as a completely rational person he asks, What have I to gain? What have I to lose?

What he has to gain is the eventual sale of one more cow at the end of the season. So that's pretty good. What he has to lose is the loss from overpasturing the commons. But this loss is shared among all the herdsmen. He doesn't pay for this by himself; they all pay for it. And so the loss to him is very slight. Consequently, he says, the only rational thing for me to do is to add one more cow to my herd, because I gain one more cow when I sell it and I lose only a little bit in the meantime because of overpasturing.

But this same sort of reasoning implies also that he should add two more, and three more, and four more, and so on, without limit. The same type of reasoning is used by every other herdsman. The result is that they all add more to their herd, and destroy the commons through overgrazing.

Now the important thing to notice about this is that each man is behaving rationally; each man makes a rational decision when he adds to his herd, a rationally correct decision. And yet the final consequences of all these individually correct decisions is complete destruction of the commons. Since they are all locked into this system, since they cannot avoid this, I speak of their situation as a *tragedy* of the commons. A tragedy is any course of events which individuals are powerless to prevent, so long as they play the game by the rules.

This insight of Lloyd's explains why it is that private property is superior to commons in a crowded world. Under a system of private property where each herdsman owns the pastureland on which his cows graze, the individual is responsible for what happens. He has an *intrinsic* responsibility, because if he makes the wrong decision he's going to suffer from it. He's going to destroy his own pastureland, whereas when the pastureland is shared by all, he does not have that intrinsic responsibility and essentially his responsibility is zero. As a matter of fact, you might say it's worse than that in the commons because he actually has to gain by mistreating the commons.

This type of analysis is needed to call our attention to the fact that in terms of their pure forms there are really three basic political systems and not two, as we're usually led to believe. We're usually led to believe that the only choices are private enterprise and communism. But you see, the commons is a system utterly different from either one of these, and is really worse than either.

We need to label this type of a system with a name so that we can speak of it, so that we can discuss it intelligently. And until we do get this label, people are going to continue to suffer from verbal pollution, continue to be misled by improperly used words.

For example, I am sure all of you have seen at some time or other an advertisement showing a fancy, electronically equipped ship plowing through the ocean with all sorts of gear for catching fish. This ad includes a statement of this sort: "Feeding the poor of the world from the inexhaustible wealth of the seas through the benefit of American private enterprise."

Now that is a bunch of crap. In the first place, we don't feed the poor of the world. Only 17 percent of the fish from the oceans go to the poor countries of the world (and even there they probably go to the wealthy people). Yet the poor countries constitute 67 percent of the world. That's the first falsehood in the statement. The second falsehood is that the wealth of the seas is "inexhaustible." This is not true. We have heard before of the inexhaustible wealth of the American forests, of the inexhaustible game on the American prairies. Every one of the inexhaustibilities has been or is being exhausted.

The same thing is true for the oceans of the world. Though at present cropped only to about a third of the extent they could be, the oceans also have limits. The wealth of the oceans is *not* inexhaustible.

The third falsehood is that the harvest is being reaped through the glories of American private enterprise. The exploitation of the oceans is not a matter of private enterprise; neither is it communism. Oceans are being treated as a commons. All of us—Americans, Russians, Japanese, Peruvians—everybody who's out there in the ocean getting fish out of it is exhausting the commons, and we are all locked into a system that has no end except tragedy. There is nothing we can do, each one of us acting rationally, except exhaust the wealth of the oceans. Then we will all be worse off than we are now.

The only thing we can possibly do is to change the rules, and no doubt some day we will. At the present time we don't see how to, principally because we have no international organization to make rules that we will accept. So in the meantime, all of us are playing out this game of the tragedy of the commons in the oceans of the world.

GARRETT HARDIN is a professor of biology and biological science at the University of California, Berkeley, Calif.

EUGENE P. ODUM

FIVE ACRES

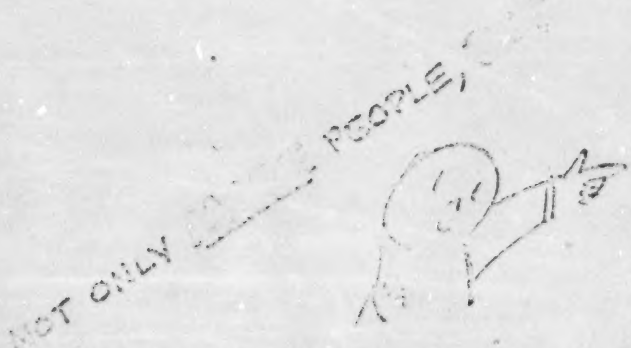
University of Georgia, Athens, Ga., April 22

The most important single problem faced by the human race is controlling and managing our own population on an optimum rather than a maximum basis. The population density that is optimum for the individual's welfare and freedom of action is much less than the maximum number of people that might be merely fed, housed and clothed as dehumanized robots or "domestic animals." Individual freedom can not be maintained and social problems can not possibly be solved under conditions of overpopulation. It is important to realize that the optimum population density for a highly technical and affluent society is very much lower than for a subsistence society because the individual's use of resources and his production of wastes is so much greater. Thus, the U. S. is now in as much danger of overpopulation at its level of living as is India at its level of living standards. We can not just sit back and let the food supply determine how many people the earth can support, because it will support more "warm bodies" than quality human beings.

To maintain an American diet and an American style of life, each person may need as many as five acres. Only a very small part of this five acres is needed to supply food, clothing and shelter, if we would be satisfied merely with getting enough calories, having one suit per year and living in a one-room apartment. But to support us in the good life to which we are accustomed, a lot of space is needed to take care of resource demands, domestic animals and recreation, and to cope with air, water, noise and other pollution.

Consider for the moment that one person in five acres is a reasonable density. Georgia is rapidly approaching that level. . . . Georgia could be badly overpopulated by the year 2001!

EUGENE ODUM, professor of zoology and director of the Institute of Ecology of the University of Georgia, is the author of *Fundamentals of Ecology*.



MARYA MANNES

HYMN OF THANKSGIVING

Bryant Park, New York City, April 22

This is a hymn of thanksgiving from the people of the United States to their gods: the god of plenty, the god of profit, and the goddess of convenience:

Lords of Affluence and Avarice, Holy Creators of the Gross National Product, accept herewith these sacrifices in gratitude for the American continent which you bestowed on us, with all its mountains, rivers, lakes, seas, and valleys, and with the liberty given to each of us to do with them what we pleased.

In boundless gratitude for all this wealth, O gods of plenty, profit, and convenience, we lay at your feet a hundred billion cans of beer and bottles of Coke, sixty billion plastic containers and paper wrappings, ninety billion tons of raw sewage, and enough lethal chemicals in air and water to kill legions of animals and to invade our lungs with deadly gases and our blood with deadly poisons.

O lords of affluence and avarice, we repay this infinite generosity of the Gross National Product with Gross National Pollution: seas of oil, rivers of cars, the ugliest cities in the world, and all the sick and poor and criminal human waste produced by them.

These we have made in your name from the boundless beauties you stole from the Creator of all living things. May we now expiate these massive crimes by repudiating you and by restoring the beauty of life on Earth before its death claims us all.

Amen.

MARYA MANNES is a writer and critic.

THEODORE FOIN, JR.

STRANGERS

University of California, Davis, Calif., April 22

. . . Population density has one potentially important effect. Evidence is accumulating that we don't care very much for one another anymore, that we are more and more calling many more people "strangers." Studies on rats show physical and psychological changes that are attributable to the process of crowding. These include cannibalism, failure to care for young, overaggressive defense of territory, changes in the adrenal glands and in the liver, hyperactive nerves, highly irregular reproductive activity, and finally, premature death. Social scientists are finding that Americans are beginning to show signs of increasing isolation from one another. The result is increasing dehumanization—particularly in the large urban centers where people have become so conditioned to human suffering that they can successfully ignore it. . . .

THEODORE FOIN is an associate research systems ecologist at the University of California, Davis, Calif.

EDMUND S. MUSKIE

A Whole Society

Harvard University and University of Pennsylvania
Cambridge, Mass., and Philadelphia, Pa., April 21–22

. . . First, I want to define for you what I think the environmental crisis means.

It means that we must outgrow our traditional way of solving problems one at a time—each in its own limited context—and unrelated to side effects.

It means that we must rethink what we mean by "cost," what is economical or not economical, or what we can afford or cannot afford to do.

It means, at bottom, that our old value systems—whatever may be said for or against them—no longer respond to our needs or fit goals relevant to our future.

Those who believe that the environmental crisis relates to trees and not people are wrong.

Those who believe that we are talking about the Grand Canyon and the Catskills, but not Harlem and Watts are wrong.

And those who believe that we must do something about the SST and the automobile, but not ABMs and the Vietnam War are wrong. . . .

Our goal has never been to create a society where human greatness took a back seat to economic growth and technological change. We have sought a society where men could live in harmony with their environment and in peace with each other. In many respects, our growing economy and our mushrooming technology have moved us toward that goal. But in too many other ways, the costs of unrestrained and uncontrolled growth have caught up with us.

If economic growth means rivers that are fire hazards, we had better redirect economic growth.

If prosperity means children dying from lead poisoning, we had better redistribute prosperity.

And if progress means technology that produces more kinds of things than we really want, more kinds of things than we really need and more kinds of things than we can live with, we had better redefine progress.

We are not powerless to effect these changes.

We must go to the ballot box with an environmental conscience and elect leaders who have made a commitment to a healthy total environment.

We must go to stockholders' meetings with the power of proxies, as Campaign GM seeks to do, and require industries to change their ways of doing business.

And we must go to the cash register with the power of our dollars and buy from industries that do not pollute.

If one phrase can characterize our traditional outlook as Americans, that phrase has been, "There's more where that came from."

We have thought that there was always more of everything. But now the time is coming—or it is here—when there is no more:

— no more clean air or clean water;
— no more room for our garbage and trash;
— no more patience for poverty; and,
— no more tolerance for energy-sapping wars, overseas or at home. Whether or not we can find ways to achieve fundamental change in a free society is the acid test of a democratic experiment.

The environmental conscience may be the way to turn the nation around. All we need is hardheaded decisions to save our own skins. . . .

Our technology has reached a point where it is producing more kinds of things than we really want, more kinds of things than we really need, and more kinds of things than we can really live with.

We have to choose, to say no, and to give up some luxuries. And these kinds of decisions will be the acid test of our commitment to a healthy environment.

It means choosing cleaner cars rather than faster cars, more parks instead of more highways, and more houses and more schools instead of more weapons and more wars.

The whole society that we seek is one in which all men live in brotherhood with each other and with their environment. It is a society where each member of it knows that he has an opportunity to fulfill his greatest potential.

It is a society that will not tolerate slums for some and decent houses for others, rats for some and playgrounds for others, clean air for some and filth for others.

It is the only kind of society that has a chance. It is the only kind of society that has a future.

To achieve a whole society—a healthy total environment—we need change, planning more effective and just laws and more money better spent.

Achieving that whole society will cost heavily—in foregone luxuries, in restricted choices, in higher prices for certain goods and services, in taxes, and in hard decisions about our national priorities. It will require a new sense of balance in our national commitments. . . .

The only strategy that makes sense is a total strategy to protect the total environment.

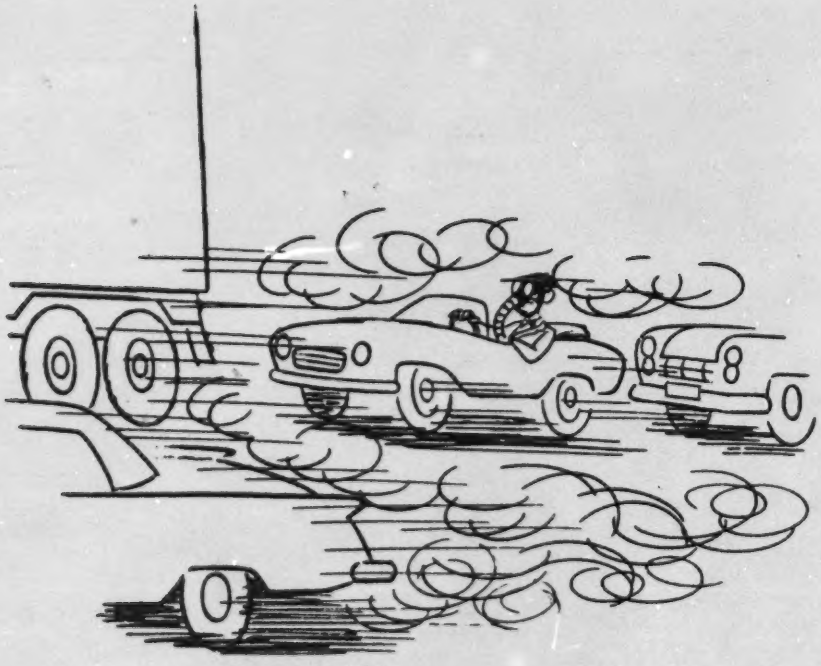
The only way to achieve that total strategy is through an Environmental Revolution—a commitment to a whole society.

The Environmental Revolution must be one of laws, not men; one of values, not ideology; and one of achievement, not unfulfilled promises.

We are not powerless to accomplish this change, but we are powerless as a people if we wait for someone else to do it for us.

We can use the power of the people to turn the nation around—to move toward a whole society. . . .

Senator Muskie is a Democrat from Maine.



CHECKLIST FOR ORIENTATION

So that students can proceed at their own pace, many of the orientation activities are unscheduled. As you study the guide, you will be aware of the activities that require special instructions or group participation.

When you have completed each of the following items, have it checked and initialed by the person indicated. When all items are signed, you have completed orientation and may use your time entirely for work on your project and for your course contracts. If you need to leave school, you may do so by signing the checkout sheet.

DO NOT USE THIS SHEET. You will be given an individual Checklist Card.

*_____ (adviser) 1. Vital information supplied: name, address, home phone, employer form (if employed), picture made for ID card, schedule card filled out and updated.

_____ (adviser) 2. Environmental game played.

*_____ (adviser) 3. Selected environmental readings finished and listed.

*_____ (adviser) 4. Minimum of five films viewed and annotated (turn in list).

*_____ (adviser) 5. Mini-research Module completed and turned in.

_____ (ESP staff) 6. Black-and-white photography finished (sample submitted).

_____ (ESP staff) 7. Cinematography finished (group movie made and edited).

*_____ (adviser) 8. Overhead projector and transparency making mastered.

_____ (ESP staff) 9. Interviewing techniques completed and demonstrated.

*_____ (ESP staff) 10. Research article study completed (turn in form).

*_____ (ESP staff) 11. Polution testing done (turn in results).

*_____ (ESP staff) 12. Course credits arranged.

*_____ (ESP staff) 13. Tentative proposal submitted and approved.

NOTE: Starred (*) items will have material to be put in student's file.

ENVIRONMENTAL GAMES

Nearly everybody has played MONOPOLY at some time. This is a game of business — or real estate, investment, profit and loss, etc. Recently there have been developed some games which use environmental problems as the basis of play. Not only are they fun, but they enable the player to see more clearly some of the opposing forces or values that make solving environmental problems so difficult.

The following games are recommended by the Environmental Studies Staff. During orientation we want you to play <u>at least one of these, for at least one hour</u> with the required number of others to make a group. When you have done so, have your advisor sign the orientation checklist. We hope that you will play again, for fun, and that you will be willing to lead the playing of a game with another group if the opportunity arises.

<u>Balance</u> — A decision-making game focusing on the causes and effects of disturbing our ecological balance.

<u>Dirty Water</u> — A decision-making game designed to teach players about the biology and economics of water.

* <u>Make Your Own World</u> — A decision-making game in which players are forced to face the many-sided issues involved in the expansion of facilities to meet the desires of an expanding community.

<u>Planet Management</u> — A decision-making game where each player strives to keep a balance between the expanding population and the available resources.

* <u>The Pollution Game</u> — A role-playing game designed to help players understand how a community functions when the preservation of the environment is the issue at hand.

* <u>The Redwood Controversy</u> — A role-playing game designed to help players understand the issues involved in environmental planning. Players learn to bargain, compromise, and negotiate to resolve problems.

* <u>Rescue in Space</u> — A role-playing game dealing with problem of population and the distribution of resources, using a space ship to represent the limited environment.

* <u>Smog</u> — A decision-making game in which players are acquainted with many of the problems faced by administrators in controlling air pollution.

*= Available from ESP Office

THE MEDIA EXPERIENCE

I. INTRODUCTION

Media, a collective term used to describe all audio-visual materials and equipment, both print and non-print, is being used more and more as teaching tools. Because this is true, we are including a section of the handbook to tell you how you may use media effectively as you pursue your environmental project.

This section will not provide specific instructions on the use of certain equipment. It will, however, give brief descriptions of the various media and tell where this media may be found. Instructions will be provided by one of the media specialists.

Please read this entire section. If there is a point in the section which is not clear to you, do not hesitate to ask a staff member for an explanation.

R.R.H.

II. USING MEDIA

A. PRINTED MATERIALS:

The use of media, both print and non-print, will be necessary as you pursue your project. This section deals with the effective use of printed materials such as books, government reports, pamphlets, maps, photographs, periodicals, periodical indexes, and newspapers.

Most of these materials will be available in your school library. You must develop a facility at using them, for they are valuable and indispensable tools.

1. Books:

   Most books in libraries are divided into two basic groups according to use. Reference books are books that remain in the library. Circulating books are those that may be checked out.

   Among some of the more important reference books that you will find in libraries are encyclopedias, state and city documents and reports, directories, dictionaries, and science handbooks. At one time or another during your project, you will have to use these.

   Many books treating environmental topics may be checked out of your school library. Paperback copies are also available in many local bookstores. The Environmental Education Staff has compiled an annotated bibliography of books which constitutes Section I of The Resource Book for Environmental Education, a companion volume to this text. This bibliography will serve as a useful guide in choosing books for your reading and research.

   The ESP Office maintains a small collection of the books which are listed in the Resource Book. You may check these out.

2. Government Reports and Documents:

   The United States Government Printing Office is the largest publisher in the nation. The Government Printing Office maintains a bookstore in Atlanta in the Federal Building at Peachtree and Baker Streets. A number of valuable environmental publications are available there.

   "Ecology," a catalog of environmental publications by the G.P.O., is available from your advisor or in the ESP Office. You may use it at any time.

3. Pamphlets and Clippings:

Libraries often maintain a file of pamphlets and clippings arranged by subjects. This is called the vertical file. You may be able to find useful information on environmental subjects in this tool.

A small collection of pamphlets and clippings is also available in the ESP office. You may also use these upon request.

4. Maps:

Maps are also indispensable tools which can be found in your school library. Some libraries have a separate collection of maps. Good maps may be found also in atlases and encyclopedias.

Maps of specific area of the city may be secured from Thomas M. Lowe, Jr. and associates, 1920 Monroe Drive, N. W. Phone, 875-0136. There is a nominal fee for this service.

5. Periodicals and Newspaper:

Periodicals and newspapers are available in your school library. They contain the most recent information because of their frequent publication. You will find them most useful in undertaking your project.

6. Periodical Indexes:

Periodical indexes are used to find out which information appeared in certain issues of magazines. Reader's Guide, which is available in the school library, is the most common periodical index.

Environment Access and Environment Index which relate specifically to environmental topics, is available in the ESP office. You may check these out upon request.

7. Photographs:

Most school libraries maintain a picture file. These are visually excellent photographs arranged alphabetically be subject. Your librarian will be happy to assist you in the use of this valuable tool.

B. NON-PRINT MEDIA

The use of nonprint media is extremely important to the independent learner. Nonprint media provides the learner with "instant teaching."

Through the use of non-print media the student is provided with a teaching-learning situation which he can control and gain the best results.

1. Microforms:

   Microforms are minaturized printed pages, transferred to film. They usually come in two styles - Microfilm and microfiche. Most school libraries have back issues of periodicals on microfilm. The microfilm reader is used to make microfilm readable. Microfiche may also be used on the microfilm reader with minor adjustments.

2. Filmstrips:

   Another popular non-print medium is the filmstrip. Filmstrips provide the learner with photographs which are transmitted on a screen through use of the filmstrip projector. Your school library will have a number of filmstrips available. Ask the libraries to assist you in locating filmstrips useful to you.

3. Transparencies:

   Transparencies are visual images recorded on acetate and transmitted through the use of the overhead projector. Their use is most feasible for charts and maps which need explaining when they are presented.

4. Kits:

   Filmstrips with accompanying recordings are usually referred to as kits. This audio-visual experience is usually helpful in that what is seen on the filmstrip is explained on the recording. A number of kits on environmental issues are available in your school library.

5. Films:

   A large number of 16mm films will be made available to you by the ESP staff. You should make every effort to view as many of these films as possible. They may provide new ideas as you pursue your project.

6. Television and Radio Programs:

   Local television and radio stations often feature special programs dealing with the environmental crisis. Watch your local newspaper for announcements of these programs so that you may watch them.

III. PRODUCING MEDIA

The production of media will insure you of two major advantages: (1) you will become skilled in the use of media equipment; (2) you will produce media which will assist in communicating and interpreting your findings.

A. VISUAL EQUIPMENT:

Photographs, slides, Super 8 mm films, and transparencies are some of the visual media that you will be able to produce yourself as you pursue your project. It is to your advantage, then, to learn as much as possible about the equipment which records, processes, and transmits these visuals. Listed below are the types of visual equipment commonly used by ESP participants.

1. Still Photography Cameras

   Nearly everyone has access to some kind of camera, be it the simple box or instamatic, the automatic polaroid, or the more sophisticated single or twin lens reflex camera. Learning to use the more complicated camera can be challenging and enjoyable; both prints and slides can be produced by the single and twin lens reflex camera. (See Section "Photography.")

2. Motion Picture Cameras

   Super-eight millimeter cameras, which are simple and economical to operate, can be used to make motion pictures. Several ESP students have made excellent films. If you have access to a Super 8 camera, perhaps you will want to make a film about your project. (See Section on "Cinematography.")

3. Transparency Makers

   Most schools have a thermofax copying machine which can be used to make transparencies. The process is simple, but a special type of acetate must be used. Some schools have a Xerox 4000 photocopy machine which also will print transparencies; but, again, a special type of acetate is required. The expertise of a key operator is also necessary.

B. AUDIO EQUIPMENT

Audio equipment is used to record sound. Interviews, narrations, and types of noise may provide an integral part of your project.

1. Cassette Tape Recorders

   A Craig Cassette tape recorder, with instruction booklet, may be checked out from the ESP Office; this recorder may be operated by battery or electricity.

2. Reel-to-Reel Tape Recorders

   Reel-to-reel tape recorders are in all schools through the library. They are particularly useful to record material which must be edited.

C. AUDIO-VISUAL EQUIPMENT:

1. Combinations of audio-visual equipment:

Almost any of the audio and visual equipment listed here may be combined to produce an excellent presentation. For example, color slides may be taken with the SLR cameras and a script recorded on the cassette tape recorded will result in a slide-sound presentation.

2. Video Tape Recorder:

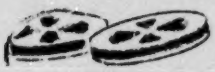
VTR is perhaps the newest audio visual equipment on the market. It provides instant replay of sight and sound.

The ESP has a VTR which one of the curriculum media specialists will show you how to use. There is also a portable VTR available from the Area Office which can be used for outside shots. The media specialists will arrange for your use of this equipment.

SELECTED FILMS AND FILMSTRIPS

A great many films and sound-filmstrip sets have been issued recently by educational organizations, government agencies, etc., dealing with environmental awareness or concerns. Several of these will be available at your school for viewing. Your adviser will help you make arrangements. Keep a list of the ones you see, recording the name of the film and the producer. Make a brief, one-paragraph summary of the central idea of each.

When you have viewed at least five films or filmstrip sets, turn in your list to your adviser and have him sign the orientation checklist.



SELECTED ENVIRONMENTAL READINGS

On the following pages is alist of topics about which much concern is felt all over the world. The Council on Environmental Quality included this list in its third annual report as a checklist of measurements of data which are urgently needed. As part of your orientation we want you to read, from your textbooks,at least one article dealing with each of the five main headings (Underlying Factors, Resource, Ecological Factors, Pollution, and Manmade Environment)

Turn in to your adviser a list of your readings. Be prepared to discuss them with him/her.

CHECKLIST OF ENVIRONMENTAL PARAMETERS (taken from the third annual report of the Council on Environmental Quality)

I. Underlying Factors

A. Population

1. Absolute size--United States and world
2. Birth rate--United States and world
3. Death rate--United States and world
4. Age composition
5. Lifespan, by sex and race
6. Immigration and emigration

B. Economic development

1. GNP, absolute and per capita, by sector
2. Capital investment, by sector

C. Urbanization

1. Percent population in central cities and suburbs
2. Percent population, by population size of community

II Resources

A. Supply and demand--renewable resources

1. Water, by region and type of use
2. Timber

B. Supply and demand--nonrenewable resources (United States and world)

1. Coal
2. Oil
3. Metals
4. Phosphorous
5. Uranium
6. Other

C. Land

1. Amount of land available for food production
2. Amount of land used for food production
3. Amount of urbanized land
4. Strip-mined land-reclaimed and unreclaimed
5. Development in flood plains
6. Land devoted to transportation-related activities-urban and nonurban
7. Amount of wetlands, by type
8. Amount of land used for public works projects
9. Wild and natural areas

D. Food

1. Agricultural productivity
2. World food supply vs. demand (including caloric and protein value)
3. Fish and other ocean food harvest and reserves

E. Solid waste and recycling

1. Amount of municipal (residential and commercial) solid waste, by type of waste
2. Amount of industrial solid waste, by source and type
3. Amount of agricultural solid waste, by type
4. Percent materials recycled, by type

F. Energy

1. Total BTUs of energy used
2. Electric power consumed
3. Mix of fuel used for energy supply
4. Productivity per energy consumed

III. Ecological Factors

A. Climate

1. Solar radiation amount, by type
2. Temperature change

B. Natural disasters

1. Earthquakes-property damage and human injury
2. Hurricanes and tornadoes-property damage and human injury
3. Floods-property damage and human injury

C. Wildlife

1. Wildlife Quality Index
2. Wildlife Management Effectiveness Index
3. Wildlife Habitat Index

D. Maintenance of major ecocycles

1. Nitrogen
2. Carbon
3. Other

IV. Pollution

A. Air

1. Amount of emission, by type and source (Major pollutants: SO_2 CO, oxidants, NO_2 hydrocarbons, suspended particulates)
2. Percent population exposed to levels above primary standards (health index)
3. Ambient air quality (index of ambient levels for each major pollutant and composite index for all pollutants)

B. Water

1. Amount of effluents, by source, type of pollutant (Major pollutants: BOD, COD, or TOD, dissolved oxygen, dissolved solids, suspended solids, phosphorus, ph, salinity, oil, phenols, fecal coliform), and type of water body used for disposal
2. Ambient water quality, by region and type of pollutant
3. Ocean dumping, amount and type
4. Number and area of lakes eutrophied
5. Percent population served by drinking water meeting standards
6. Subterranean water pollution

C. Radiation

1. Major radionuclides present in media
2. Average human radiation exposure
3. Number of nuclear accidents

D. Pesticides

1. Amount of pesticides used, by type
2. Amount of major pesticide types in media, food, and humans
3. Injuries due to pesticides

E. Noise

1. Ambient noise levels, urban and non-urban

F. Toxic substances

1. Mercury, in media, food, and humans
2. Cadmium, in media, food and humans
3. Other metals in media, food, and humans
4. Synthetic organic chemicals (other than pesticides) in media, food, and humans

V. Manmade Environment

A. Housing

1. Percent substandard housing
2. Housing availability
3. Density per square mile
4. Neighborhood quality

B. Transportation

1. Journey-to-work time

C. Aesthetics

1. Billboards and junkyards per mile
2. Proportion of urban green space

D. Occupational Environment

1. Work injuries
2. Workplace pollution

E. Recreation

1. Open space-parks, wilderness
2. Cultural facilities
3. Work/leisure time ratio

Mini-Research Module

1. Choose a topic from the collection of more than 40. (Ask your adviser for the book of topics.)

2. Copy the page you select on a copying machine, if possible. No one else in your group should have the same topic.

3. Complete the following tasks related to the topic.

    a. Find at least one encyclopedia reference. List the title, volume, and page numbers.

    b. Locate at least two periodical references. List the title and volume and page of the periodical, and title and author of the article. Find one of the two articles in the library. Write an abstract of it.

    c. Find at least two books containing information on the topic. Give author, title, publisher, and pages.

    d. List three agencies which might be helpful in research on the topic. (Do not call any one. Use the phone book or reference materials which list agencies.)

    e. List at least one film related to the topic.

    f. Suggest a problem, related to the topic, which might be studied on a local level.

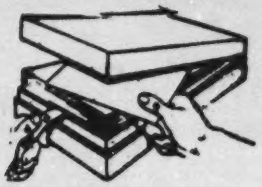
PHOTOGRAPHY

WITH DEVELOPING AND PRINTING

In 1930 Eastman Kodak Company offered a simple Brownie camera to every child who would have his twelfth birthday during that year. Most twelve-year-olds then had never taken a snapshot, much less owned a camera. Now even first graders go about taking pictures, and anyone with the capablilties of a six-year-old can operate an Instamatic or Polaroid camera with reasonable probability of success.

Photography has become a part of our life style and has even been hailed as the art form of the future. So many participants in our Environmental Studies Program have wanted to use photography in the course of their investigations that we now include basic photographic skills as part of orientation. You will take a roll of black-and-white film, develop it (no darkroom required) and make at least one enlargement (in darkroom). If you think photography would be helpful in working on your problem, you may improve your skills and get credit for art or science. (See course requirements for Art 643110 and Science 482210)

There are limits to what a simple box camera, such as a Brownie or Instamatic, can do. It cannot take pictures in dim light, nor of fast moving objects, nor of things very close to it. The Environmental Studies Program has several cameras which can do all of these things and more. You will be able to use one of these to take a roll of black-and white film. It may seem complicated at first; but each of the features that you find is there to make the camera more versatile and more capable of taking pictures under special, often adverse, circumstances. The manual that comes with the camera will help you, and so will any beginner's book of picture taking, such as you can find in the school library. While you are looking at the books on photography spend a couple of minutes on the problems of composing your picture. You don't want your subject, if a person, to look as if he had a tree sprouting from the top of his head . . . so photograph him against a plain background instead of the shrubbery! There are many tips available that make the difference between an ordinary picture and a really great one.

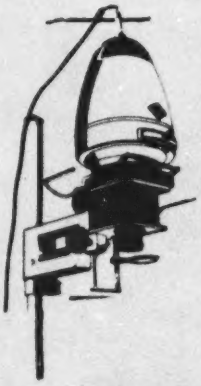


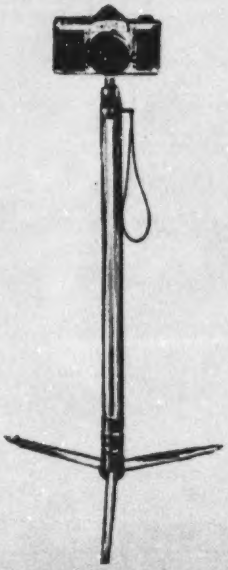
You can develop black and white film without a darkroom if you have a changing bag . . . and there is one for every school. One of the staff will schedule a session for developing pictures, and after this you can do it by yourself. It is amazingly easy.

Printing and enlarging are not hard, but they require a darkroom. You may be able to use your own bathroom or kitchen or basement, after you learn, but you need these things: a place that can have the light excluded; a safelight, meaning a light that is of a color the photosensitive paper doesn't react to (Usually a dim, red light that can be used in any lamp socket); and an enlarger. Your school may have a darkroom. At Northside we have a darkroom and two enlargers. If your school has a room that can be made dark, but no enlarger, we will lend you one for a few days; or you can come to Northside and use the darkroom there.

All of you will be given a chance to enlarge one of your negatives. The best thing about doing your own enlarging is that you can choose the part of the negative that you want to use and block out the rest, enlarging the chosen section to whatever size you like.

For orientation you need to submit a sample negative and print. Don't worry if they aren't prizewinners. You can polish your technique later if you decide to contract for photography credit. The purpose of the orientation exercise is to convince you that you can do it, and that it's not hard.





CINEMATOGRAPHY (Making Movies)

Had you ever thought about being a movie producer and director? You are about to have the chance! The Environmental Studies Project has the use of two Super 8 movie cameras and will provide a 50 foot roll of film to each school for an original movie, with scenes shot by students at that school, on the general topic of pollution. This is really not very much film, and if there should be more than five students at a school, we will furnish another 50 feet. In shooting movies you need to plan your filming in very great detail. If each of you has ten feet to shoot, figure how much time that is (at 32 frames per second) and practice with the empty camera until you feel at ease with it. Then decide what you want to film. You may need to scout around for a day or so in advance, searching for the most effective shots. Be sure to read your manual and beginner's book for the important tips on handling the camera (don't zoom too much; don't pan too fast) and choosing your scenes.

When you have all participated in the filming, and the roll is shot and developed (this you can't do yourself), then we will take all the film from the participating schools and put them together into one big film on pollution in Atlanta. You will get to see the finished movie and may want to help prepare a sound track (using a cassette for a tape recorder) to go with it.

Several students have made very good movies in connection with their projects. Perhaps you would like to view some of them just to see what can be done by a rank amateur like yourself!

USING THE OVERHEAD PROJECTOR

Many of you will be telling others what you have found out in the course of investigating your problem. Telling is much more effective if you can illustrate what you are saying. Movies and slide shows are good, but not every topic lends itself to photography; or perhaps you did not have time to make any pictures. Almost any investigation, however, can be illustrated by the use of an overhead projector. You can make diagrams and write as you talk, thus eliminating the need for any advance preparation whatever. A better way is to prepare transparancies to accompany your talk. You may make these in several ways, and all are extremely easy.

The simplest transparency to make is a copy, on the Thermofax or Zerox copying machine, of a page or chart, using a special transparent acetate sheet which reproduces, in black and white, the material you want to show your audience. If someone at your school cannot show you how to do this, ask the staff for help. You must make one such transparency as part of your orientation.

Another way to illustrate your talk with transparencies is to get a plain acetate sheet and draw on it with a wax crayon or magic marker. Water-soluble, fibertip pens will make colored lines that show up beautifully, but will wash off when you are ready to use the sheet for something else.

There are some other processes, more costly and time consuming, but these are usually enough for a beginner. If you get interested, however, and want to try more elaborate visuals, ask us for help, or check out books from the Teacher's Professional Library at the Instructional Services Center.

ENVIRONMENTAL TESTING AND SURVEYS

In the past some students have avoided problems dealing with certain kinds of pollution because they were afraid they couldn't do the testing. "I never was good in science" was a common excuse. True, some tests are very complicated and require sophisticated equipment; but by no means all of them are. Simple tests that a non scientist can do will tell you a great deal about the stream in your back yard or the lake where you swim.

For orientation we want you to take a look at testing for or making a survey of water pollution, air pollution, noise pollution, and the problem of solid waste disposal. The staff will hold sessions to help you with any new techniques.

WATER POLLUTION: We want you to make a survey of some natural body of water, such as a creek, river, pond, or lake. Choose one within easy reach so that you may visit it more than once. The first and most obvious step is what is called the "Eyeball Test". Look at the general appearance of the pond or stream. How big is it? How deep? What color is the water? Is it turbid? (Find out how to use a Secchi disc to measure the turbidity.) Is there an odor? If you are measuring a stream, how fast is it flowing? (Can you give the answer in feet per minute?) Do you see any gross pollution, as from bottles, tires, cans, paper, etc.? What evidence of plant or animal life do you notice. List kinds and amount. Get a sample of the water so that you may later determine the pH and the amount of dissolved solids. You may have the opportunity to make a coliform bacteria count or to determine the cissolved oxygen or the phosphate content.

AIR POLLUTION: Look around your school area, or the neighborhood around your home and find at least five visible sources of air pollution. These could be burning dumps, somkestacks, or even the exhaust from a car or truck. Describe the color of the smoke or discharge from each of these polluters and speculate as to the probable content. YOu will need to remember that black smoke is usually caused by carbon, and must come from burning some fuel that is either pure carbon (coal) or a compound of carbon. White smoke is often just steam. Look up other colors and find out what is responsible for them. While you are about it, list five invisible pollutants that you know are in the air of cities.

NOISE POLLUTION: Using the sound level meter, make five related determinations, in decibels. For example, you might measure the noise level at five different spots in the school during class changes; or the noise level of five household appliances; or the noise along the highway of five different types of vehicles (truck, car, motorcycle, etc.)

CONDUCTING AN INTERVIEW

When you begin seeking information for your project, an important source will be persons and agencies in the community outside the school. These are valuable resources to you, so handle them carefully—they are currently working in the field and most often have the latest information in that area or can best direct you to that information. Besides, human resources are often more fun to tap than the written word!

You may have to submerge "your own thing" for a time to get the results you want. (That's why we want you to study this section!) Many persons outside the school are amazed at the scope and/or maturity of the topic you, a high school student, are handling, and many who do not have direct contact with young people often are not quite certain how to respond to you: they wonder about giving information that is possibly too technical, not giving enough information, talking down to you or over your head, etc. YOU can set the standard by the way you handle yourself and the manner in which you request assistance. Students in the Environmental Studies Program have always found our community resource people eager to help. They like sharing information about their field with another who is similarly interested—you.

Your basic modes of communication with these persons will be the telephone and the personal interview. Often the telephone will precede the interview session, so you may initially have paved your way before you get there. Consider the advantages and disadvantages of both communication tools and then consider your assets and determine which method will allow you to "score." IF YOU CAN, utilize the tool with which you are most effective; the choice may not be yours—so practice both the telephone and personal interview until you are at ease with either. The following chart will help you compare the two interview types:

Telephone (voice-to-voice contact)	Interview (face-to-face contact)
1. Your personality and interest comes through only in your words and tone of voice	1. Your personality and interest are expressed by gestures, facial expressions, and appearance—which can help or hinder understanding.
2. Shaking knees or other physical distractions are less obvious as stumbling blocks to communication.	2. Signs of nervousness may cancel much of what you say and may even prevent understanding.
3. Only your voice verifies information and tells whether you understand.	3. Your sincerity, feelings, and interest are reflected in the way you look and act.
4. You can use notes to help you; you may even write down and read your opening statement and questions, so you can be sure to cover everything you planned.	4. You should use very few notes (although you may have written questions to guide you through the interview), but you should briefly record information if it is vital to your understanding (and if it is not in written materials which your interviewee may give you).

EXPERIMENT: To judge the effectiveness of each of the above modes of communicating, say hello to a friend you haven't seen for some time—do it the first time facing him and then do it back-to-back. What do you have to change to make your greeting effective?

* * * * * * * *

FOR SUCCESSFUL TELEPHONE CALLS:

1. Be sure that you know what you want to ask.
2. Identify yourself and your needs.

   Wrong: I was wondering if you had information about water pollution in Georgia.
   Better: I'm John Jumpingjack, a student in the Environmental Studies Program at North Central High School. I am doing a project on the water quality of the Foaming Falls area and I would like information about the coliform count in the last five years.

   [Longer, yes, but you've set the scene to get what you are looking for.]

3. Use simple, short, descriptive words; do not be afraid to use technical names, numbers, unusual words—like coliform, pathogen—if you are knowledgeable about them.
4. Use courteous phrases: "May I...please...thank you, etc." Use the name of the person you are talking to.
5. Always verify information that you need to be exact: numbers, technical information, time, date, place, and person for interview.
6. Be yourself—natural, friendly, sincere, and grateful. Talk slowly, but watch "ums" and "uhs" and "you knows."

FOR SUCCESSFUL INTERVIEWS:

1. Dress appropriately. Check out the office "lifestyle" of the agency you are approaching. Cutoffs and sandals will most likely turn off an officer of the Georgia Power Company as will a suit and tie at The Bridge on 10th Street. Conform to the situation for best results.

2. Be on time—even early. It makes an impression in this "Future Shock Society," where we often blame the traffic, an accident, lack of parking, getting lost, etc., for our constantly being late.

3. Be polite. There is still no substitute for good manners. Mabe today they are even more appreciated because the supply seems diminishing.

4. Identify yourself and explain what you hope to do and what you would like from the interviewee.

5. Come prepared. Have questions, at least eight or ten written out, to refer to in case you are shy, or get stuck, or the person you have come to see begins with "How can I help you?" or "What is it you want to know?" or "O. K., shoot!"

6. Look directly at the person while he is speaking; he feels that you are really interested in what he has to say—as indeed you are!

7. Be gracious and show your appreciation. At the conclusion of the interview, offer him an opportunity to share in the results of your research (if such an offer seems appropriate)—a copy of your report, an invitation to your oral presentation. Send a short "thank you" note.

Sample:

(Your address)
(Date)

Dear Mr./Ms. _____,

Thank you for your time and assistance with my project on (subject matter). I am particularly grateful for (mention something specific).

Sincerely,

(your name)

* * * * * * * * *

WHAT TO DO IF - - - - - - - - - - - - -

If you find yourself bring shunted (referred) from one person to another, check the following possibilities:

(a) You are in the wrong place for the information you are seeking.
(b) You are not making yourself understood sufficiently so that another person can understand the information you are seeking.
(c) You are turning someone off—consider your appearance, your speech, your questions.
(d) You're there at the wrong time—maybe he is pressured or having a bad day, and maybe you can call or come again.

If you still can't decide what is wrong, call us at 351-4679 and let's discuss it.

PRACTICE, GET SET, GO:

To complete your orientation module, you must do these effectively:

1. Role-play a phone call requesting information or making an appointment for an interview.

2. Role-play an interview—about five minutes in length.

   You may do this in one of three ways:

   1. Role-play with another ESP student or a friend or your advisor and record it on a cassette tape for evaluation by ESP staff.

   or

   2, Role-play with an ESP staff member over the phone.

   or

   3. Arrange to have an ESP staff person meet you at your school or in the ESP Office and role-play in person. Perhaps several of the ESP students would like to do this at the same time.

[FOR PRACTICE IN INTERVIEWING: If you know what you want to do for your project and can set up practice interview situations that relate directly to your situation, by all means do it. But if you're stuck for something to do for practice, use these

Hypothetical project—The "can-do" question: What can the ordinary citizen do with cans, other than just throw them in the garbage?
—are there recycling facilities?
—who will take what?
—how can you tell which can is recyclable?

Hypothetical project—The "next-step question: What organizations can the environmentally aware citizen become involved in?
—how can one determine which are environmentally sound, which are possibly the off-shoots of special interests or well-meaning but unknowledgeable groups?
—how can one decide what legislation is environmentally necessary?
—how can one determine which do-it-yourself projects are environmentally effective?]

Using the ESP Resource Book, telephone index, or other listings, make a list of three people/companies/organizations to call on the telephone. Practice questions that will determine whether you need an appointment for a personal interview or you can get needed information by telephone.

Assume that one of these phone calls results in an appointment for personal interview. Role-play that interview.

BEFORE YOU DO THESE PRACTICE SESSIONS - AND AFTER YOU HAVE DONE THEM - STUDY THE SECTION "CONDUCTING AN INTERVIEW." WHEN YOU ARE READY TO DO YOUR INTERVIEWS FOR THE ORIENTATION CHECK-LIST, LET US KNOW.

Remember, this is part of your orientation activities—to be completed before you are on your own. You'll be glad you did!!

Study of Sample Research Papers

Much can be learned from even a cursory reading of the research papers published in the leading journals in various fields. In Georgia State's graduate course in "Methods of Research" students are required to evaluate five preselected research articles and to choose (and evaluate) five additional ones from any research journal available in the library.

You will find that, as you read research articles critically, you become aware of some of all of the following:

1. the method of research . . . historical, descriptive, experimental, or philosophical *
2. the source of the problem and its significance (at least in the mind of the researcher)
3. the types of subjects (children, adults, mice, whales, albinoes, diabetics, zebras in capitivity, or whatever)
4. sources of data
5. hypotheses tested
6. experimental design and control used
7. the handling of data (statistical, graphic, etc.)
8. skills required (statistics, graphic representation, samples, etc.)
9. the bibliography cited
10. the nature of the conclusions
11. the style of writing used (note the formality, the almost exclusive use of third person, the tendency to conciseness)
12. the abstract or summary (often at the head of the article, after the title)

We have begun a collection of research articles, and will be continuously adding new ones from various sources. Most of them deal with environmental problems and may serve as suggestions for projects. For example, a study of arsenic in the Kansas River might suggest an investigation of arsenic in the Chattahoochee; a study indicating that cadmium poisoning can be reversed by doses of ascorbic acid (Vitamin C) might suggest a parallel study to check the claim.

We would like for you to look over the collection, and also to browse in the back issues of SCIENCE in the Environmental Office, and make one study to turn in (use a prepared sheet like the one which follows). A sample paper and abstract will be included in this section.

* Historical research is concerned with the past. It may be chronological (rise and fall of an empire; life of a king); review (a particular period, such as a study of adolescence in 17th centure New England); or past event (clarification of what did and did not take place, as a study of the assassination of President McKinley).

Descriptive research is concerned with the present. It could involve action; the solution for a practical problem, (such as a proposed landscaping plan for a MARTA terminal); or evaluation or assessment of the effect of a program or a practice (as a study of the use of transit buses since the 15¢ fare went into effect); or other.

Experimental research is concerned with the future. It predicts the future by observing the results from causes already known (as a study of the effects of intermittent exposure to jet aircraft noise upon speed of learning telephone numbers; this would involve a control group learning a list of digits in comparative silence, contrasted with a matched group engaged in the same activity under the same conditions except for exposure to jet aircraft noise.)

Philosophical research is concerned with analysis of a set of original innovative ideas or designs (for example, any utopian scheme, such as a new method of learning, the open classroom, the free university.)

Study of Sample Research Papers
(Cont'd)

NAME _____ DATE _____

TITLE OF ARTICLE _____

AUTHOR(S) _____

JOURNAL (Title and volume and pages) _____

ABSTRACT: (Note: if one is included, copy it in space below; otherwise prepare a very brief abstract)

METHOD OF RESEARCH:

_____Historical; _____Descriptive; _____Experimental; _____Philosophical

PURPOSE OF STUDY _____

_____

SUBJECTS: _____

SOURCES OF DATA: _____

SKILLS USED: _____

HOW TO GET STARTED ON AN INDEPENDENT RESEARCH PROJECT

. . . AN OUTLINE . . .

I. Finding a topic for the research

A. Do these things

1. Think about what interests you; your research should be something you enjoy. If you love the out-of-doors, think of a problem that is nature-oriented, not one of urban noise pollution.

2. Read, REad, REAd, READ, and then read some more. The more you read the more ideas will occur to you. When you read about the work some one else has done ask yourself if you could do a variation on it: something local, something just a little different.

3. Talk to other people who have done independent research. Maybe their experiences will give you ideas.

4. Discuss your ideas with your adviser or with other students; such discussions have a way of generating more and better ideas.

B. Avoid these things

1. Don't expect to get a topic for research from a published list of suggested titles; reading such a list MAY give you an <u>idea</u>, but the title itself is almost certain to be a misfit if you don't tailor it to your own situation and interests.

2. Don't ask busy experts to tell you what you can do for a project; many of them resent being your brains for you; after you select a problem and have done your homework on it, <u>then</u> you can ask them specific questions.

C. While you are thinking of a problem, remember that you are much better off if you can avoid using

1. <u>Animals</u> (they are expensive, hard to care for, reproduce or die when least convenient, require special diets and housing; and you may get in hot water with the S. P. C. A. or the anti-vivisectionists; (see p. 65 for guidelines in the care of animals if you still <u>must</u> tackle a problem involving them.)

2. <u>Children</u>, or students in school (school authorities take a dim view of outsiders coming in an interrupting their scheduled plans in order to conduct research.)

3. <u>Drugs</u>, pathogens, or hazardous chemicals (you might get infected, burned, poisoned, or sued!)

4. <u>Elaborate equipment</u> or expensive materials (even if some expert says he will let you use his $10,000 thingamometer, he is sure to be out of town just when you need it!)

II. Identifying and stating the problem

A. Ask yourself what you want to find out. A problem has been variously described as a "felt need", a "difficulty", or "an itch to know". (Ex. Why is Bilious Beach closed to swimming..what kind of pollution is in it and where is it coming from?)

B. Make a tentative, trial statement of the problem. Try to make it logical, specific, and precise. Scientists have a saying, "A problem well stated is half solved." Another quotation from research is , "An investigator who begins his study in confusion has nowhere to go but into more of it."

C. Look at your tentative statement and break it down into bits and pieces. Try to expand it into all the branches you can think of. (Ex. Why is Bilious Beach closed to swimming?. . . how long has it been closed? . . who closed it?. . what reason was there for doing it? . . . what is in it? . . . what sources are there of the contaminants? . . . how much is there of the undesirable substance(s)? . . .how can this be determined? . . .what is being done to stop it? . . . are there laws to force the people or businesses responsible to stop? . . do we need laws that don't exist, or do we need to enforce the laws we already have? . . . what will happen if people swim in the water despite the contamination? . . what is the situation at other beaches similar to this one in other parts of the country or world?) You may now want to rephrase your problem to make more clear what you will and will not include.

D. Be sure the problem is within your capabilities. Consider especially

1. Time . A quarter is approximately eleven weeks long. All of your work must be submitted for evaluation well in advance of the end of the term, and you will probably be presenting your findings in a seminar somewhere. Research involving living things which have to grow (and which may die!); or reproduce (and nobody can shorten the gestation period of a laboratory animal just because a deadline is approaching!) may be just too time consuming for a quarter's work.

2. Cost. Make an estimate of the probable expenses before you settle on a problem. Maybe you can find a cheaper way. Maybe we can help you borrow equipment. If the cost is out of reach you will not be the first person to shelve a project because funding was denied! Better not undertake it than have to give up with no data, or go bankrupt!

3. Complications. Some projects have obstacles in unexpected places. Take children, for example. You may have a terrific idea for studying the effect of something or other on the behavior or learning of children. The schools, camps, and leaders who are responsible for the children you want to test, however, will already have their programs planned and may be somewhat less than enthusiastic over having a student come in with questionnaires and surveys to interrupt their schedule. In fact, in the Atlanta Public Schools a routine requirement is the submission of at least ten copies of the proposal and every test or survey to a committee; and the committee decides (taking 2 or 3 weeks to do so) whether or not the applicant will be permitted

to carry out his planned investigation in the school or schools requested. In general, based on many frustrations in the past, we advise against problems involving mass testing of children.

4. Skills. There is almost no limit to what an eager and inspired and determined student can do when he sets his mind to it. However, if your project requires knowledge, skills, or equipment which you don't have and cannot get in a reasonable time, you should find out in the beginning and do some revising. You might spend a whole quarter learning a technique and then have no time left to use it.

III. Finding resources to aid in investigating the problem

A. Think about resources as you formulate the proposal. Many students have said that they just wouldn't know what they needed until they got into the problem. Nonsense! True, you may find some additional books or agencies as you work, but you had better know your basic needs and find sources for at least the introductory portion.

B. Further suggestions on how to find help have been given elsewhere in this book. See page 57

IV. Scheduling your work

A. Along with writing your proposal you should make a work schedule. First decide what you have to do. Put it in writing. List all the skills you have to acquire before you can gather data. Consider all the books and articles you have to find and read. How much time will it take to make your surveys, or collect and analyze your samples? Remember that you have to sort, process, and interpret what you discover. Then you have to assemble it into a report or other form of presentation. Estimate how much time this will take.

B. Next work backwards. Establish the deadlines by which you have to have that seminar prepared or that report submitted. Figure how long before that date it will take you to write (and type) the report or get up the speech (with pictures, maps, slides, etc.). Put down that date as your deadline for gathering all your data and related material. By working in reverse you can figure out when you have to start, and how long you must allow for each step in order to complete all the parts of your work in time and ON time.

C. A word of warning! Things have a way of taking longer than you estimate, even if they don't go completely wrong. You should beware of the slow start! Get into high gear fast as a safeguard against unforeseen and time consuming obstacles later.

WRITING A PROPOSAL

Having found your problem, considered it carefully, and stated it precisely, you are ready to write your proposal. A proposal is somewhat like a blueprint. It is a statement of what you propose to do; in a sense it is a plan. Someday you may be in the position of writing a proposal to apply for funds with which to carry out some plan or idea which you have. You might be president of some civic or neighborhood organization which is seeking a recreation center, a community orchestra, a golf course, a hospital, or a museum. In any event, you can be very sure that the agency or foundation which might give you the money is going to want a full and detailed description of what you have in mind. This proposal of yours now must also be specific and detailed. You may find later that you need to alter it, but this should come about only if you discover some new angle you want to pursue. In such a case you would submit a revised proposal. You want to avoid this, if possible, because changes cost you time, trouble, and maybe money. It is far better to spend time checking out your original plan and perfecting it rather than finding later that you were on the wrong track.

In writing your proposal remember

1. Formal proposals are written in the third person. This may seem awkward at first, but practice anyway. (Ex. NOT, "I am going to take samples from Cruddy Creek at quarter mile checkpoints, from Cow Lane to Oak Stump Road," but rather "During this study samples of the water of Cruddy Creek will be taken weekly at quarter mile checkpoints, etc."

2. A proposal must be brief, objective, and free from opinion and personal references. It should answer a question, not state an assumption and set out to prove that assumption. (Ex. NOT "This study will show that it is not safe to let children and dogs wade in Cruddy Creek," but rather, "This study will measure the bacteriological and chemical contaminants in Cruddy Creek and will attempt to determine how safe the water is for human an animal recreational use."

3. A proposal should open with a narrative statement giving the background of the study and justification for it. (Ex. "Residents of the community say that as recently as ten years ago fish and tadpoles swam in Cruddy Creek; its waters were clear and sparkling; children and their

pets played in it. Now no life can be found in it; there is an odor about it at times; and parents are afraid to let their children wade in it. What has brought about this deterioration of a lovely stream? This study will . . . . . etc."

4. The body of the proposal is your plan...what you are going to do. If you were going to ask for money you would need to include a budget. You might want to try doing this anyway. Occasionally students have been able to get financial help for a worthy project, and your adivser or the staff can suggest some possible sources.

5. In conclusion we would like you to indicate how the results of your study will be presented to others. Explain whether you will write a paper (and if so will it be illustrated by photographs or drawings or accompanied by a tape?) or present a series of talks or make a movie or write a series of newspaper articles or what.

On the following pages you will find two proposals that were written by students like yourself. They are reproduced exactly as they were submitted to us for approval. They even show the corrections and suggestions that were written by the adviser or staff. Study these and see if you can do as well or better!

Flint; The River Speaks for Itself

Proposed by: Christie Mason *Third Quarter '72*

The Flint River has been designated by several conservation groups as a scenic river. It is a sadly misused river. It is neglected, but it is not lonely. There are many other rivers in Georgia and across the nation that are in the same predicament. The saddest part of the outlook is the fact that there is no adequate protective legislation concerning scenic rivers.

It is my belief that public awareness is part of the answer to our problem. This is the purpose of my study: to make readily available to anyone who is even remotely interested in the problem a concise general description of the present status of the Flint River.

The study will be in two major parts. The first part will be a film depicting the scenery and scenic pollution along the Flint. The film will be shown with a sound tract which will be synchronized. The sound tract will consist of selected music. There will be no human narration so as to allow the audience to arrive at their own conclusions. The second part of the study will be a paper, including the results of tests for dissolved oxygen, phosphates, and dissolved solids. In conjunction with the results of this testing there will be a report on land and water use, and its effects on the river.

This study of the Flint River was suggested by Mr. Rob Mason of the Georgia Forestry Commision, who has been working

on a land and water use file which would include the area around the Flint. He will be available for consultation and assistance during the project.

Samples will be taken from the Flint at predetermined sites. The portion of the Flint to be sampled is that which stretches from its source at Hartsfield International Airport to the water intake purping station for Griffin, Georgia. The samples will be tested for dissolved oxygen, phosphates, and dissolved solids. The results of the tests will be presented in a report which will include graphic, statistical, and pictorial presentations. The report on land and water use along the Flint will be researched from topographic maps of the area. There will be simple maps depicting the area included in the report.

A short report on the mass media's presentation of the environmental crisis will be part of the project, but not of the study. It will include my impressions of the presentations.

vague

Put as 4th paragraph

The film itself will be concerned with ~~the presentation of~~ the scenic beauty of the Flint ~~has to offer~~ and the scenic pollution found along its banks and in its waters. The soundtract will be selected music which will be synchronized with the film.

replace with 3rd paragraph

It is hoped that this study will result in increased public awareness and perhaps eventual action towards preserving the Flint in its natural state.

TEMPERATURE INVERSIONS AND THEIR EFFECT ON AIR POLLUTION

PROPOSED BY JOHN LANGFORD

THE NATURAL PHENOMENON OF A TEMPERATURE INVERSION HAS RECENTLY BEEN RECOGNIZED AS A MAJOR CAUSE OF POLLUTION BUILDUP AND DISASTERS. THE OBJECT OF THIS REPORT SHALL BE:

A) TO PRESENT A REPORT ON THE "TEMPERATURE INVERSION"-WHAT IT IS, WHAT CAUSES IT, HOW IT AFFECTS AIR POLLUTION, AND WHAT HAS AN EFFECT ON IT.

B) TO PRESENT A REPORT ON PAST DAMAGES AND/OR CONSEQUENCES DUE TO INVERSION-CAUSED POLLUTION BUILDUPS THROUGHOUT THE WORLD.

C) TO ATTEMPT TO STUDY AND SOUND FOR INVERSIONS AND EFFECTS IN THE ATLANTA AREA.

IN A NORMAL ATMOSPHERE, THE TEMPERATURE DECREASES WITH ALTITUDE. WARM AIR TENDS TO RISE, AND WHEN THE TEMPERATURE OF THE GROUND LEVEL IS HIGHER THAN THE TEMPERATURE ABOVE THERE WILL BE A CONSTANT FLOW OF AIR FROM THE GROUND UPWARDS.

HOWEVER, WHEN THE TEMPERATURE OF THE AIR AT THE GROUND BECOMES LOWER THAN THE TEMPERATURE OF THE UPPER ATMOSHERE THIS VENTILATION PROCESS IS DRASTICALLY REDUCED AND THE POLLUTION WHICH IS GENERATED INTO THE ATMOSPHERE IS NOT SWEPT AWAY. THEREFORE, THE CONCENTRATION OF POLLUTANTS IN THE ENTIRE AIR VOLUME UNDER THE TEMPERATURE INVERSION INCREASES GIVING WAY TO THE CREATION OF PHOTOCHEMICAL SMOG AMONG OTHER THINGS.

INVERSIONS VARY IN DEGREE, AND ARE AFFECTED BY LOCATION, WIND, AVERAGE TEMPERATURE, AND OTHER CONDITIONS. THE FIRST PORTION OF THE REPORT WILL BE BASED ON RESEARCH OF EXISTING BOOKS AND REPORTS, COVERING EVERYTHING AVAIABLE ON INVERSIONS.

THE SECOND SECTION OF THE REPORT, A HISTORY OF POLLUTION DISASTERS DUE TO INVERSIONS, WILL BE BASED ON BOOKS, REPORTS, LETTERS, AND PHAMPLETS. IT WILL BRIEFLY TRACE THE HISTORY OF AIR POLLUTION, AND THEN DETAIL DISASTERS SUCH AS LONDON, ENGLAND IN 1953, AND THE COMMON INVERSIONS OF CITIES SUCH AS LOS ANGELES.

THE THIRD SECTION WILL BE A STUDY OF INVERSIONS AS THEY RELATE TO ATLANTA. THIS WILL CONSIST OF INTERVIEWS WITH LOCAL AUTHORITIES, ETC, AND, IF FEASIBLE, ACTUAL BALLOON OR MODEL ROCKET SOUNDINGS, CARRING ELECTRONIC TEMPERATURE-SENSITIVE TRANSMITTERS. (FEASIBLITY WILL BE BASED ON COST, SENSITIVTY OF EQUIPMENT, AND INFORMATION NOW EXISTING) (ATLANTA MAY NOT HAVE INVERSIONS)).

THE PROJECT WILL BE PRESENTED IN MID-MAY OF 1973. ALL RESEARCH IS PLANNED TO BE COMPLETED BY MAY 1. SOUNDINGS, IF ANY, WILL TAKE PLACE DURING MARCH AND APRIL. THROUGHOUT THE TWO SCHOOL QUARTERS COVERED, SEPARATE REPORTS, WITH MORE DIVERSIFIED INFORMATION (NOT ALL PRETAINING TO INVERSIONS) WILL BE PRESENTED AS NEEDED TO MEET COURSE REQUIREMENTS. A FINAL REPORT, MEETING THE ABOVE OBJECTIVES, WILL BE PRESENTED, ALONG WITH BUT SEPARATE FROM ANY ADDITIONAL REPORTS REQUIRED FOR COURSE CREDITS. THE CREDITS WILL BE OBTAINED TWO A QUARTER, HENCE THE FINAL REPORT WILL NOT BE READY WITH THE FIRST QUARTER CREDIT REPORTS. THE CREDITS FOR WHICH I HAVE CONTRACTED FOR THE FIRST QUARTER ARE: PHOTOGRAPHY/ART 511, WITH MR. PAINE; AND PROBLEMS OF THE URBAN ENVIRONMENT 592140, WITH MR. HARRIS. WORK FOR BOTH COURSES WILL BE PRESENTED ON FEBRUARY 22, 1973. SECOND QUARTER COURSES WILL BE ARRANGED AT THE END OF THE FIRST QUARTER.

CONTRACTING FOR CREDITS

All the time you are trying to find just the perfect problem for your study you should be giving thought to the course credits which you will be getting as a result of your work. It is not hard to tell, from the nature of the problem, while you are still just exploring the possibilities, whether or not it will involve science, or photography, or math. If you are required to earn credits in a certain area during this quarter, you are necessarily restricted somewhat as to the projects you can choose. For instance, if you must get five hours of math in order to graduate, you must choose a problem which will yield a large amount of quantitative material; lots of data. If you need credits in health, you had better stay away from studies of plant ecology or urban deterioration, and look for something dealing with environmental factors in disease (such as asbestos, lead, mercury, radiation, etc.)

The ideal situation is that in which no requirements are in force to restrict you, and you can choose a problem for the interest it holds, and explore it in whatever direction it may lead, and take the credits that evolve naturally.

We are listing here brief descriptions of some of the most popular courses. These have turned up repeatedly as fitting rather easily into the projects which students have done in the past. Members of the staff will be meeting with you to help you choose your topic of study and draw up course contracts for your credits. In general the following guidelines will be found applicable for all contracts.

GUIDELINES FOR DRAWING UP COURSE CONTRACTS

1. Students must remember that the five hours credit they are seeking for each course represents the equivalent of a formal class meeting 1 hour per day, 5 days per week, 11 weeks per quarter.

2. A contract for earning credit must be worked out with the teacher, adviser, or staff member who will be responsible for guidance and evaluation.

3. Periodic progress checks must be made with the contracting teacher.

4. Due dates for completion of the contract or various parts of it should be agreed upon by negotiation between student and teacher.

5. The proportion which each part of the work is to count should be agreed upon in a discussion between student and teacher.

6. Both student and teacher should sign the contract, with each retaining one copy.

7. If circumstances change, a contract may be renegotiated; until this is done, however, the old contract is in effect.

8. Normally contracts represent the minimum requirements which will earn the course credits desired. Grades will be based upon the quality and quantity of the work done.

9. Penalties may be imposed for work submitted after the mutually agreed due dates.

10. Periodic written evaluations will be sent home to parents. A copy of each will be retained in the student's file.

NOTE: The courses which follow have only the briefest of descriptions. If you want to know more, ask a teacher in the appropriate subject area to discuss it with your or let you see the behavioral objectives of the course. Meeting these objectives will be part of your contract.

ENGLISH

MASS MEDIA (English 302110)

Study of different approaches, purposes, audiences of the major media; a specialized study of media coverage and treatment of some phase of environmental concern, related to the student's project.

JOURNALISM (English 303410)

Study of basic vocabulary, methods, and techniques used in journalism; study of the various types of journalistic presentations (written, oral, visual); development of ability to produce some of these types; use of this ability in reporting different aspects of student project as well as in final reporting.

ORAL LANGUAGE (English 303210)

Study of the craft of writing short stories, poems, skits, personal essays; creating some of each of these types of literature, using some aspect of project as stimulation.

EXPOSITORY COMPOSITION (English 303010)
COMPOSITION (English 303270)

Composition course contracts should be geared to the individual student's needs, which can be ascertained through diagnostic testing. Each of the above courses includes a study of usage, organization, mechanics (punctuation, spelling, etc.) designed to improve and expand the student's skills and abilities, and the use of these skills in different types of written composition.

ADVANCED COMPOSITION (English 304270)

Study of formal and familiar essays and of skills necessary for formal composition; study of techniques for library research, for documentation of a research paper; utilization of these skills in reporting on student project.

HEALTH

HEALTH SEMINAR (Health 604010)

A course dealing with personal, family, and community health and seeking to explore public health services as well as considering problems encountered in life situations, including health quackery, fads, and frauds. (NOTE: This course fits smoothly into environmental problems of noise pollution, radiation pollution, heavy metal poisoning, air pollution, water pollution, etc.)

MATHEMATICS

BASIC MATHEMATICS (Math 432130)

Graphs and problem solving. (NOTE: This course fits very well with many environmental investigations, but some schools do not give credit for it if a student has already had a higher course, such as algebra or geometry.)

PROBABILITY (Math 434070)
Informal examination of probability and inference; counting; axiomatic probability; statistical measures; the binomial and normal distributions, sampling, and hypothesis testing.

PHOTOGRAPHY

NOTE: The basic photography course is one in which the student develops the technical skills necessary to operate a camera and to develop and print the pictures he has taken. He should be able to recognize the capabilities and limitations of a variety of cameras and films, and he should develop a vocabulary such that he can grasp the content of lectures, instructions, and photographic literature. Such a basic course may be taken in the field of acience or art, the emphasis being different in each case.

PHOTOGRAPHY (Science 482210)
A course designed to instruct the student in processes,procedures, and materials that are used in basic photography.

PHOTOGRAPHY (Art 643110)
A course to acquaint the student with the technical and aesthetic aspects of photography as creative expression and visual communication.

PHOTOGRAPHY, ADVANCED (Art 643120)
A second level course for students desiring in-depth explorations in photographic techniques, materials,and processes.

CINEMATOGRAPHY: A foundation in the techniques of filmaking. The student makes a movie (8mm, super-8, or 16 mm) and in the process develops skills in script writing, shooting, editing, titling, animation, etc.

SCIENCE

ECOLOGY (Science 484470)
A study of selected communities with emphasis on the interrelationship among plants, animals, and the abiotic environment from the standpoint of conservation.

ETHOLOGY (Science 504510)
A study of the behavior of animals in natural and in experimental environments.

MICROBIOLOGY (Science 504450)
A course in which emphasis is placed on the diversity and ecological importance of both pathogenic and beneficial microorganisms.

SCIENCE AND SOCIETY (Science 484430)
The investigation of major science-related porblems of society such as pollution, overpopulation, drug abuse,etc.

SOCIAL STUDIES

U. S. LAW (Social Science 563060)
A study of U. S. law and legal procedures as they affect individual rights and responsibilities.

PERSONAL ECONOMICS (Social Science 572050)
A study of the influence of economic decision making by individuals as producers and consumers in the U. S. economy.

CONTEMPORARY ECONOMIC PROBLEMS (Social Science 574010)
An in-depth study of economic principles as they apply to current economic problems.

INTRODUCTION TO PSYCHOLOGY (Social Science 584100)
An introduction to the elements of psychology pertinent to high school students, including learning theory and analysis of normal behavior patterns and their social implications.

FIELD STUDY GEOGRAPHY (Social Science 592120)
Systematic application of geographic techniques in the filed, emphasizing cortographic skills and land-use analysis and planning.

PROBLEMS OF AN URBAN ENVIRONMENT (Social Science 592140)
Geographic and socio-economic analysis of the phenomena of urban growth and change including location, historical development, characteristics of, and increasing interdependence, emphasizing geography of cities and political geography.

CULTURAL AREA STUDY (Social Science 584050)
A multi-disciplinary study of a specific nation or region, such as Russia, China, Atlantic coastal region, southeastern United States, north Georgia, etc.

COMPARATIVE CULTURES (Social Science 584080)
Patterns of human behavior, primitive, traditional, and contemporary, are examined using the methods and materials of the anthropologist.

III. ON YOUR OWN

NOTES ON DOING A RESEARCH PROJECT

(Condensed and modified from the book Individual Investigations in Science, by Paul Westmeyer, University High School, Urbana, Ill.)

Resource People

The main source of information which you will need in your studies will be printed materials, and you should make wide use of them; but there may also be occasions on which you will need individual help from some one who is expert in his field. The first expert you should consider is your teacher or adviser or some expert within your school.

You may need help in obtaining supplies and apparatus for some of the laboratory work. You may even need advice and help in the building of pieces of equipment which you cannot otherwise obtain. Your adviser or another teacher is probably in the best position to give you this kind of help. Then, when you are planning your investigation you will need two kinds of help. First of all you need help in clarifying the problem, or even in isolating an experimental idea from a general maze of thoughts. At this point it is helpful if you can talk it over with some one who will be able to make suggestions and ask questions in such a way as to help you to organize your ideas.

The second major bit of consulting help which you will need is for some one to check your plans before you try them. They should be checked for completeness, inclusion of essential details, accuracy, feasibility, and, above all, for safety. Your teacher or adviser has had experience and training in making, following, and checking such plans. Ask him to help you.

There are three reasons why you may also require the help of a subject matter expert . . . a consultant. First, it may be that a topic important in your work is treated in printed references all right, but that you find yourself unable to understand it. You will then need some one to explain the material to you orally. Second, even though you feel that you understand a given set of materials pretty will, it may be well to try them out by discussing them with some one who can ask you questions about the topic. Students often find that when they have to prepare an oral presentation of a topic their understanding of it is greatly increased. Third, there may be many aspects of any given problem that are not treated in the literature. The only person who can give you help in these cases is the expert himself who has worked on them. Of course you may not even be aware that there are such lacking areas in a given study; this is all the more reason for you to consult, if possible, with an expert.

If the expert you wish to consult is some one other than your teacher or adviser, how do you contact him, and how do you request help from a stranger? How do you ever locate an expert? The best thing for you to do is rely on your teacher for help in selecting and contacting persons who can help you, but there are many things you can do yourself. If you or your parents have friends associated with a university perhaps you can arrange to meet a member of the faculty who would be willing to help you.

There is nothing wrong with your requesting help from people who are expert in a field even if you do not know them personally, provided you make your request in the right way. The first point is, always be polite. Don't ask for help in such a way as to suggest that it is due you, and never try to put the person in a position so that he cannot refuse. Remember he is busy and owes you nothing; and if the expert responds to your request it is only because of his own courtesy.

Second, be sure that you make clear the reason for your request. State concisely the problem you are working on. Explain very briefly the progress you have made, and cite your inability to obtain the help you need from other sources. (Do not criticize these "other sources", however). Then very precisely state the questions you would like to have answered.

Third, make it easy for the person whose help you are requesting to give you such help. If you make your request by mail state very clearly the questions you want answered; do not ask for a general discussion of a whole topic. Suggest that the person reply at his own convenience, and enclose with your letter a stamped and self-addressed envelope for his reply. If your request is made in person suggest an appointment at the convenience of the expert. When you arrive for the appointment get down to business immediately; do not waste the time of the person who is helping you.

Fourth, offer to contribute something (help with some work; some knowledge that you have found; at least a report of your work when it is finished) in exchange for the help given you. In any event, whether you obtain the help you want or not, always thank the person for his time.

Keeping Records

It is extremely important that an independent investigator keep accurate records of his work. We will discuss in this section several aspects of this record keeping and make suggestions regarding methods of preparing records.

Reading records

Most of us are somewhat in the habit of reading with a purpose. We generally have some specific assignment either of reading material or of questions to be answered after reading about the topic involved. Or we may be reading for the purpose of entertainment. However, since you are working at this time on specific problems, most of your reading ought to have a specific purpose.

You ought to do regular reading in appropriate journals, books, textbooks, etc., just for general information. When you do this type of reading you ought to take notes...at the very least you ought to record the author and title if it is a book (plus the page numbers on which you found the items of particular interest) and the title of the article and name of the publication if it is a periodical. If you are truly reading with a purpose, however, you must take more careful notes than this. You must note topics of interest, facts that are new to you, location of diagrams you may want to use later, ideas that strike your fancy (either your own or the author's ideas) etc. And you ought to keep a careful bibliography of all the materials you read. If there are problems set up in the reading material and you choose to work them, you certainly should keep a record of the method employed and the solution.

There are two reasons for these rather detailed notes when you are doing independent study. First, since there is no formal teaching, and you will hear very little information from your instructor or adviser by word of mouth, but will obtain most of the information you gather by reading; it will help you greatly in remembering if you write it down in some form. It has been demonstrated that if more than one of the senses is involved in a learning situation the likelihood of the material "sticking" is increased. Furthermore, if you are to take notes on reading material you will almost certainly want to condense much of it, and this will require thought which might not be applied if you were merely skimming over it. (Bear in mind, however, that there are certainly some parts that you will want to skim). Second, if you are reading with a purpose, a primary goal will be to locate problems which you might be interested in trying to solve as a part of your study. When you do locate such a problem it is not likely to "pop out at you" from the pages of the book you are reading (although it may do so); it is more likely to jell from the results of reading and recording several different viewpoints or varied facts concerning some topic.

Once you have set down a problem, define it carefully so that any one reading your notes would thoroughly understand what you are trying to investigate. It should be apparent immediately that the main problem presents many sub-problems, and further sub-problems will appear as you begin the process of solving the main one. These should be written down and explained in detail. Then you are ready to find some answers. Now you can read with another purpose. You have several problems clearly defined, and you can find sources and read material specifically on Here you should keep careful notes.

Main problem: _____

Sub-problem _____

Source _____

(List author only and page number. The full title should be recorded in your bibliography. The bibliography entries may first be recorded on note cards and later written into the notebook at the end of a section or at the end of the notebook. There may be several pages of notes.)

After this material has been gathered and you are satisfied that the material you have answers the sub-problem satisfactorily, write a summary and answer the original sub-problem. When all the sub-problems are taken care of write a neral summary and answer the main problem.

In most cases the main problem will have been set up in such a way that the solution will involve some laboratory investigation. This may be noted in a manner similar to the other sub-problems in initial stages, but the solution should include careful laboratory notes. Material gathered in this way should also be cited in answering the main problem.

At any time when you have finished to your satisfaction the solution of the problem at hand, you should return to general reading to locate further problems if none has grown out of the previous one.

When you are reading for general information and you come across some explanation of a device, set-up, pieces of apparatus, etc. and find that, while you may understand the explanation, you just cannot visualize the apparatus, you ought to set up this item as a small problem and work it out as any other problem, including a phase where you set up the apparatus and try it out. Also, like other problems, there ought to be some written answer.

A form for bibliographical entries may be found in English textbooks or in library books on writing term papers. In keeping notes on materials read it is easier not to use footnotes. Instead, place the material that would ordinarily go into a footnote in brackets within the body of the notes.

Record of plans for an experiment

Begin the writing of plans with a clear statement of the problem. Then state hypotheses relative to the problem and give reasons for each of them. State the hypothesis to be tested in this particular experiment, usually a null hypothesis. Then write down as many details of procedures as you can include without actually trying the experiment. If the experiment is one of the "try it and see for yourself" variety, the plans should be very detailed. If it is a more original experiment, the details will probably be more nebulous.

In all cases you should carefully plan the apparatus to be used and the controls to be included, and these should be described in the written plans. Your adviser may want to check these plans for safety and feasibility at this point.

If it is possible to do so in advance, prepare data sheets on which you can tabulate observations to be made during the experiment.

Laboratory notes

The record of the laboratory phase of your study may be a continuation, in the same notebook, of the written plans. If this is not the case you should begin the laboratory notes with a clear statement of the general problem and of the hypothesis being tested. The apparatus used should also be described and/or diagrammed.

Describe concisely, but in enough detail that some one else could repeat them, the actual procedures followed. Record all observations on your data sheets. After all data have been collected they should be analyzed and any conclusions which can be drawn should be stated in the notebook.

The notes on each experiment should conclude with a paragraph or two on ideas for further study which are suggested by the experiment just completed.

Diarial records

In any course of independent study, perhaps most especially if it is a supervised course taken for credit, it is well to keep a day-by-day account of the ways in which your time is spent. Such a record will be helpful to you in planning future work since you will have some basis on which to judge the time required for different phases of the study. The record will also help your adviser to make recommendations on procedure for you. It may also serve as a part of the permanent school records of work done by students and may therefore be useful when grades are to be given, when credit is to be established, or when your high school record is being considered by college admissions officers.

The diarial record is simply a brief daily record telling where and how long you worked at the stated project and briefly describing what you did. It should probably be kept in a notebook separate from the reading and laboratory records since it needs to contain very little detail, but only concise summaries.

What to do with results

The true researcher finds joy in the fact that he is constantly adding to his own knowledge of the universe, but he is also concerned with the publishing of the results of his work in order that the fruit of discovery may be shared. Now you may feel that it would be presumptuous of a novice to attempt to publish the results of what might sometimes be considered trivial research. But this is true only if you are thinking in terms of publication by printing articles in important journals. (It may even be that some of those who use this book will achieve results worthy of such publication). You should always desire to share your results. The sharing may be done in several ways.

Seminars

If you are a member of a group of students doing independent research in your school it would be good to organize regular seminars at which the members take turns describing the progress they have made in their work. You should consult your adviser for help on the scheduling, but one way to set up the meetings might be to set aside a noon hour, a period during which all members are free, an hour after school, or even an evening hour, every other week. Then arrange the names of members of the group in the order in which they will probably have something to report. That is, a person doing a short term project should be listed first, etc. (The whole group should agree on this listing, of course).

Then each member in turn has charge of one seminar. Thus he has a full hour, or period, to discuss the details of his work. He should plan carefully, however, so that his presentation is meaningful to the rest of the group. It would be a sheer waste of time, for example, for a student working on an electronic computer to describe the complex circuits unless his audience first understood simple electronic circuits. Probably it would be best for the initial presentation to last no longer than half an hour. Then the group should be allowed to ask questions of the speaker; and, finally, he should close the meeting with a brief summary, or recapitulation, of what has been said.

The details of procedure may be worked out as the members of your group choose. They may wish to elect a chairman,or the seminar speaker may serve as chairman. Meetings may be regularly scheduled, or called as some one requests. Interested outsiders may be invited, or the whole discussion may be kept within the group.

Formal written reports

In addition to the notebook (journal) kept on all studies, it may be worthwhile for certain investigations to be written up in a more formal style. Not only may such papers be required by your adivser, or by school policy for your particular program, or for possible entry in competition; but you yourself will benefit from preparing at least one study in this fashion.

The style you adopt in writing a report should be one that suits you. However, there are limitations to what you can do, and certain general guidelines are expected to be observed.

(1) Write in a completely serious fashion. Really formal reports are written in the third person. Any kind of "wise crack" is out of place in research report. This does not mean that the report has to be "dry". Use descriptive language, but keep to the point.

(2) Balance conciseness and attention to detail in such a

way that the reader can understand what you did, but not necessarily so that he could reproduce your study point by point. Wordiness is deadly to an effective report.

(3) Begin by stating the problem or hypothesis, and end by answering the problem or explaining why the hypothesis is accepted or rejected. A report that fails to do these really has little to say.

(4) Summarize the whole report in a closing paragraph or two.

(5) Use a consistent method of giving credit to original sources. Acceptable ways are (a) regular footnotes, (b) references in brackets within the text of the report itself, (c) references by number to items in a bibliography at the end of the report.

(6) Follow the rules of good grammar.

Many good books, articles, and pamphlets have been published on how to write a research report. Ask your librarian to suggest one. An English teacher in your school should be able to help you find a guide to follow.

The formal report may be submitted to your adviser for checking. It may be mimeographed and distributed to other members of your group or to interested students in other classes. Perhaps your group will be interested in collecting several such papers and publishing its own journal for distribution to other students.

You may also wish to submit your report to a regularly published journal for consideration. Unfortunately there are few of these which accept student articles. However, some publications for the high school and college undergraduate level do solicit student research papers, and it would be worthwhile to see if you can find one of these.

GUIDELINES

If your problem will involve children or animals, there are some regulations which you should know about in advance. You might even decide to alter your approach in order to avoid some particularly time consuming red tape. You will realize that the regulations were put into effect to insure the well-being of animals or children, as the case may be.

ANIMALS:

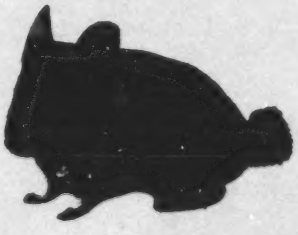
A quotation from a publication of the U. S. Department of Health, Education and Welfare, the Office of Education, entitled "Grant Terms and Conditions", reads as follows:

> "Where research animals are used in any project financed wholly or in part with Federal funds, every precaution shall be taken to assure proper care and humane treatment of such animals."

To help insure that we meet these requirements a copy of a set of guidelines developed for the use of animals in school science projects is included in this book. See page 65

CHILDREN:

In order to prevent outsiders from possibly interfering with the planned school day by excessive use of questionnaires, surveys, tests, etc, the Atlanta Public Schools have for a long time required permission for any sort of research to be done in the schools involving the students. These same regulations apply to participants in the Environmental Studies Program who want to go into schools and conduct interviews, surveys, tests, and the like. A letter from the department of research and development explains this, and a copy of the guidelines is also included.



GUIDELINES.....

FOR THE USE OF ANIMALS IN SCHOOL SCIENCE PROJECTS

With today's emphasis on the advancement of science, more and more intermediate and secondary students are participating in classroom science projects which involve experiments with live animals. Live animals should be used in classroom situations for their educational value in achieving instructional objectives, and not as research contributing new knowledge to human health and welfare as would be expected from a medical research facility.

1. In the selection of science projects, students should be strongly urged to select invertebrate animals or plants as subjects for evaluation. Invertebrates are specially suitable because of their wide variety as well as their availability in large numbers. (Several commercial firms sponsoring science talent search contests now prohibit the use of vertebrate animals as qualified entries.) *

2. Although it is not recommended, should vertebrate animals be used for experimental purposes, such experiments MUST be preplanned and conducted in such a manner that respect for basic animal life and all humane considerations are fully understood and carried out by the student.

3. Each student submitting a science project using animals MUST have a qualified adult supervisor. Such supervisor shall be a person who has had specific training in the proper care of small and laboratory type animals. The supervisor MUST assume the primary responsibility for all conditions of the experiment where living vertebrates are involved. An affidavit which includes the following requirements MUST be signed by the supervisor.

** a) The student has researched and studied the appropriate literature concerning previous work done in the student's chosen area.

** b) A written preliminary outline of the student's plan of action and anticipated outcome for the science project has been submitted and is available for evaluation. Such outline would include the specific purpose of the research.

** c) The student is prepared to orally defend his or her experiment from the standpoint of why the methodology used was the best way to arrive at the conclusions obtained.

A sample affidavit is included with these "Guidelines" and is intended to assist the student, teacher and/or adult supervisor to insure adequate preplanning of the project. Local veterinarians in nearly every community can serve as a qualified supervisor.

4. State humane laws provide for specific care and handling of all animals. Students, teachers and supervisors MUST be cognizant of such laws. Copies of appropriate state humane laws are available by contacting the local humane organization, state humane federation, the Secretary of State's office or The American Humane Association. Each state also has specific animal health regulations which must be considered. Copies of animal health regulations are obtainable from the state veterinarian or state public health office.

5. No student shall undertake an experiment which includes the use of anesthetic drugs, organisms which are capable of causing disease to humans or other animals, ionizing radiation, any substance capable of causing cancerous growth, or surgical procedures unless such procedures are performed under the direct supervision of a biomedical scientist experienced in the field of the student's investigation.

6. Students using animals under investigation MUST insure for the proper housing, food, water, exercise, cleanliness and gentle handling of such animals at all times. Special arrangements MUST be made for care during week-end, holiday and vacation periods. The comfort of each animal, by meeting its basic daily needs, shall be of prime concern.

7. Proper exhibition of all animals shall be adhered to by the student in cooperation with the teacher and supervisor. During the research period, the project shall be so located and cared for to protect the animals from extremes of heat, cold, direct sunlight or prolonged darkness. Caution must be taken to avoid the animals being teased or harmed by other students.

8. When the research project has been completed and the student does not wish to maintain the animal(s) as a pet, arrangements shall be made for proper disposition. Should the animal(s) need to be destroyed, arrangements must be made with a veterinarian for euthanasia. Under no circumstances should the student be allowed to provide "experimental" euthanasia.

* The International Science and Engineering Fair does not permit the use of live animals in exhibits.

** These requirements, which may seem stringent, are a basic part of any scientific investigation, and hence, any young scientist should begin to employ these procedures for any project using scientific methodology.

GUIDELINES FOR CONDUCTING TESTS AND SURVEYS IN THE ATLANTA SCHOOLS

It has come to our attention that any pupil in the Atlanta system wishing to conduct a survey or collect data in any school other than his own must follow specific guidlines in requesting permission to do so.

Pupils in the environmental project conducting this type of research must submit 10 copies of the proposal, 10 copies of the test or questionnaire to be administered in the schools, and a signed statement from the staff stating that the proposal has been approved.

The request must be sent to the Review Committee in care of the Department of Research and Development 224 Central Avenue , Atlanta, Georgia 30303. The committee is composed of representatives from

(1) the area office concerned

(2) the instructional services center

(3) the department of research and development

Please allow two to three weeks for approval. See the enclosed guidelines.

SEE FOLLOWING PAGE FOR GUIDELINES.

July 26, 1971 | ATLANTA PUBLIC SCHOOLS, 224 Central Avenue, S. W. | Atlanta, Georgia 30303

Guidelines for Research Activities in the Atlanta Public Schools

The Division of Research and Development encourages meaningful, applied research; furthermore, its services are at the disposal of those who elect to engage in research activities. However, because of administrative problems which frequently are associated with the conduct of educational research, certain guidelines have been formulated to regulate the research activities so that interference with the on-going instructional programs of the schools may be minimized. Accordingly, the policies and procedures which have been adopted by the Board of Education are summarized below. They are in no way intended to discourage those who would participate in research activities; but, rather, they are provided so that the research activities may be structured to maximize their educational benefits. They apply to anyone who desires to conduct educational research within the Atlanta Public Schools — including pupils, teachers, principals, graduate students, or university professors.

The criteria for determining whether or not research projects are to be conducted in the Atlanta Public Schools include the following:

1. The proposed research must have the promise of promoting the instructional program in the school system, as well as producing additional knowledge concerning education.

2. A minimum of ten copies of the prospectus must be submitted.

3. A minimum of ten copies of any instrument to be used in the research must accompany the copies of the prospectus.

4. For each instrument that will be used, at least one copy each of the following must be provided: scoring instructions, manual, norms, and interpretative data.

5. A signed statement from the researcher's college or university faculty advisor must accompany the prospectus. It should certify that the prospectus has been approved and that the faculty member recommends the research be done.

6. A Review Committee, composed of six members who are representative of the school system and who have particular concerns about the area in question, must review the prospectus and must recommend that the research be conducted.

7. New research projects are not, in general, approved for execution between March fifteenth and August thirty-first of each school year because of the many activities which ordinarily take place in the schools at that time. However, proposed research may be submitted for review during this period of the year.

8. Since two to three weeks usually are needed to review proposed research projects, researchers should file their requests early.

—Clyde T. Warren
Research Associate

WRITING AN ABSTRACT

DEFINITION: An abstract is a summary of the important content of a project.

CONTENT: The following information should be included in an abstract:

(1) The purpose and scope of the project
(2) Techniques, procedures, and materials used
(3) Results of the investigation
(4) Interpretation of the results and conclusions derived from them

An abstract should be written in the third person and should briefly describe your project. However, the single most important factor to remember in writing an abstract is to <u>be specific</u>.

By reading your abstract, one who is totally unfamiliar with your project should be able to grasp your specific topic, your treatment of the topic, and your conclusions. Your abstract, which should not exceed one typed page (single-spaced), should include information for answering the following questions:

1. What did you study?

   Wrong: The purpose of this study was to determine the effects of noise on humans.

   Right: With the use of an amplifier and an audiometer, a study was conducted to determine the correlation between loud sounds and a musician's hearing capacity.

2. When was the study conducted?

   Wrong: The study was conducted summer quarter.

   Right: Samples were taken biweekly from July 10 through August 10.

3. Who was involved in the study?

   Wrong: Interviews were held with ministers and priests.

   Right: Half-hour interviews were held with 3 ministers and 4 priests.

4. Where was the study conducted?

   Wrong: Water samples were taken at varying points of the Chattahoochee.

   Right: Six water samples were taken from the Chattahoochee River at approximately equal distances beginning at Riverbend Apartments and continuing for one mile south.

5. How was the study conducted?

   Wrong: Chemical tests were run on water samples.

   Right: The water samples were tested for phosphate content, dissolved oxygen, and suspended solids.

6. What did you conclude?

   State your conclusions. If you were unable to reach conclusions without further research, state and explain why.

On the following pages are two student abstracts and several from professional journals.

ABSTRACT OF STUDENT PROJECT

Flint: The River Speaks for Itself. (Environmental Studies Project, Northside High School), Spring Quarter, 1972.

This project included only the first forty-four miles of the river extending from Hartsfield International Airport, its source, to the water intake pumping station for Griffin, Georgia. The basic idea was to make available to anyone wishing them the results of tests made for dissolved oxygen, phosphates, dissolved and suspended solids, flow and temperature. Some eighty samples were taken and analyzed. Along with the scientific report, a short and general report on land use along the Flint was included. This report indicated the effects of the type of use on the river.

Aside from the written report, a visual supplement, in the form of a Super Eight mm. movie was made depicting the scenery and the scenic pollution in and along the Flint.

ABSTRACT OF STUDENT PROJECT

A Study of Urbanization as it Relates to Violent Crim in Atlanta (1960-1970) (Environmental Studies Project, Northside High School), Spring Quarter, 1972

In an analysis of census information, police records, and other statistical data on changes in population, population density, ethnic concentrations, and social pathology in the city of Atlanta over a ten-year period, it was found that a relatively minor population increase was accompanied by a tremendous increase in the various types of crime studied. The change of centers of crime in the city was possibly due to the relocation of large concentrations of low income groups and the establishment of a community of transients near the city's downtown district. All those areas which were high in their rate of violent crime were to some degree victims of inhomogenous land use. Also, a possible factor in the city's rise in violent crime was increased social disorganization. Conclusions based on this research were that greater social control is needed in the sense of non-institutionalized, group responsibility for the individual in addition to a greater emphasis upon the nuclear family as a stabilizing unit of socialization.

The results of this study were presented to various audiences in a series of oral reports.

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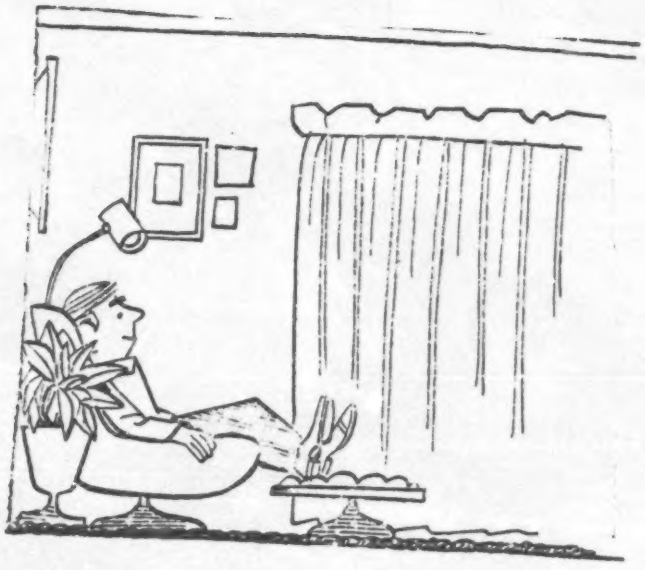
IV. LOOKING BACK



ABOUT EVALUATION

Evaluation is currently an "in" word. No longer is it acceptable to criticize a speaker or give a student a grade. Instead one makes an "evaluation" of the performance; or, even better, one evaluates achievement with respect to stated goals.

Now what does that have to do with you? For one thing, you often would like to know how you're doing. If you conduct a seminar or make a talk about what you are doing or things you have found out, you could just ask a friend what he thought of it. A better way, and one which you may be required to use if you are getting credit in some English course such as oral language, is to distribute a rating sheet to your audience in advance and have each listener return a sheet anonymously. Then you tally the results and either blush or brag! We have reproduced two such rating sheets which students have developed and used. They ask essentially the same things, but the one for young students puts the questions in simpler language. These may not suit your purpose at all. If that is the case get busy and design your own. Be sure to make the questions absolutely clear and to ask the listener to write as little as possible. Let him check something, or put down a letter or number. If it's much trouble, most people won't bother to fill out a questionnaire. Sometimes your friends will hesitate to say anything that might hurt your feelings, so to get an honest evaluation you must ask your audience not to sign the sheet.

Not only do you yourself want to know how good your work is, but your family and your school are interested in this, too. We have included in this book some notes on how you are evaluated in the environmental studies program. You have probably already figured out that doing independent study is one aspect of the program, and learning about the environment is another. Both of these are somewhat apart from the actual course credits and course grades you will earn. We try to give an evaluation of our students that tells more about what was involved in the program that just an "A" in English and a "B" in science. As you read through the evaluation section from time to time, make a mental rating of yourself. It may help you see your strengths and weaknesses.

AUDIENCE EVALUATION OF STUDENT

ORAL PRESENTATION

(for Elementary of Middle School Audiences)

In the blocks to the right, put a check mark to show your reaction to the statements about this presentation.

	Poor	OK but not good	Good	Excellent
INFORMATION				
Facts seem to be true.				
Speaker has done enough research so that we can believe his information.				
Topics are interesting.				
Topics are important to people in today's world.				
PRESENTATION				
Speaker is interested in his subject.				
Speaker is at ease and not nervous.				
I could hear and understand what was being said.				
Speaker was able to make me believe in what he was saying.				
Visual aides (charts, pictures, chalkboards, films, etc.,) helped me to understand the information.				

SPECIAL COMMENTS

I liked these things about the presentation:_____

_____

I did not like these things:_____

_____

AUDIENCE EVALUATION OF STUDENT SEMINAR

or

ORAL PRESENTATION

(for High School or Adult Audience)

Please indicate your reaction to this seminar speech by checking the appropriate column to the right.

	Poor	Just so so	Pretty Good	Excellent
INFORMATION				
How accurate does the information presented seem? Consider evidence and sources given.				
How interesting or relevant are the topics presented to people in today's society?				
PRESENTATION				
Persuasiveness...How convincing is the speaker?				
Enthusiam...How interested is the speaker in his topic? How well does this come across?				
Poise...How confident and at ease does the speaker seem?				
Understanding...How easy is it to follow the speaker's presentation? How organized does it sound?				
Voice...How interesting is the speaker to listen to?				
VISUALIZATION				
How effective were the visual aids in the presentation? How much did they add to the presentation?				
Has the speaker made full use of available visual aides, such as charts, pictures, slides, films, and transparencies?				
Did he involve the audience in his presentation?				

SPECIAL COMMENTS

I liked _____

_____

I did not like _____

_____

HOW YOU ARE EVALUATED

FINAL EVALUATION (at the end of quarter)

1. You will be given a letter grade in each course for which you get credit.
2. You will receive a rating on your performances as an independent learner (see sample rating sheet attached). This will go in your permanent record folder.
3. You will also be rated on your general environmental knowledge (based largely, but not entirely, on two tests, one at the beginning and one at the end of the quarter.)

PROGRESS REPORTS (during the quarter)

1. You and your advisor will jointly review your progress at least once a week at your appointment time.
2. At intervals your progress will be evaluated according to a form (see attached copy). One copy will be sent home and another kept in your folder. Last quarter this was done three times.

METHODS OF EVALUATION

1. Course credit and course grades: Note that the courses you are seeking and the amount of credit will be determined when you draw up your proposal. You are then assured of credit if you accomplish the goals set up. The grade you get will be determined by how well you perform. This will be determined in one or both of the following ways:
   a. Evaluation by subject advisor (team member in whose area you are getting course credit and with whom you have been working during the quarter)
   b. Evaluation with subject advisor along with others (or, the audience before whom you have presented your project; or an outsider who has worked closely with you)
   c. A combination of these.
2. Independent learning skills: Your proficiency as an independent learner will be judged by the Environmental Studies staff. (See the description, included in this packet, of a good independent learner.) This evaluation will become a part of your permanent record.
3. Environmental awareness: While you are becoming an expert on the problem you have chosen, you should also be gaining an insight into the scope and complexity of the so-called environmental crisis. Your acquaintance with the many facets of this global problem can be measured by factual quizzes, by personal attitudes and actions, and by changes in philosophy and behavior.

MID-TERM EVALUATION

Name of student_____ Date _____

Name of advisor _____ Original to parent
Carbon in student file

I. State of Student Proposal

____ In thinking stage

____ Written and submitted

____ Approved

____ In working stage

____ Work schedule submitted

II. Journal

____ A good working account

____ Irregular account

____ Not accounted for

III. Meeting with advisors

____ Student makes frequent use of advisors

____ Student meets weekly as required by board of Education rules

____ Student not meeting his responsibility

IV. Attendance at activities

____ Seminars

____ Workshops

____ Field Trips

V. Signing in and out when leaving and/or returning to campus

____ Adequate

____ Inadequate

VI. Industry, effort, study, preparation on individual project

+ + + + + + + + + +

0 10

None Superlative

INDEPENDENT STUDY PERFORMANCE EVALUATION

Students in Environmental Studies get subject matter credit for courses whose content is covered in the course of the investigation done by independent study. A letter grade is given for this course credit. However, the student's performance as an independent learner cannot be measured in such a fashion. The following rating scale is an attempt to evaluate the traits that have particular significance in the pursuit of knowledge through independent study.

_____ Quarter_____ Year_____
(Student's Name)

	TRAIT OR ACCOMPLISHMENT (0=negligible; 1=low; 2=fair; 3=average; 4=good; 5=exceptional)
	INDUSTRY, PERSISTENCE, DETERMINATION (how hard did he work? how well did he resist frustration?)
	UNDERSTANDING, INSIGHT, PERCEPTION (how well did he grasp relationships, hypothesize, interpret, extrapolate?)
	FLEXIBILITY, COOPERATION, DIPLOMACY, HUMILITY (how well could he adjust to change or to criticism? could he work well with a group, admit mistakes?
	DEPENDABILITY, JUDGMENT, MANAGEMENT (how well did he manage time, meet deadlines, make wise choices?)
	SELF-RELIANCE, INITIATIVE, CREATIVITY (how able was he in working alone, planning ahead, devising alternate methods?)
	ACCOMPLISHMENT (how worthwhile was his end-product? how well could it stand on its own merit? was it good?)

_____
(Teacher's Signature)